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ABSTRACT

Syracuse University has devised an external degree program in business administration in which students may take area competency tests that will reflect their knowledge gained from independent study or other outside sources for a bachelor's degree. The areas of competency for the degree are: Financial Information Systems; Environmental Studies; Logistics; Quantitative Analysis; Accounting; Finance; Marketing; Operations Management; Personnel and Industrial Relations; and Advanced Quantitative Analysis. These fields are equivalent to the degree of study that makes up a major in the on-campus program. Courses other than business are required for the external degree in the areas of Humanities, Mathematics, Social Science, Biological Science, and Physical Science. It is still to be seen whether the external degree will be accepted on a par with the residential degree program by both the business and academic communities. (HS)

ED 070381

XD

External Degree Program

Areas of Competency in Business Administration

December 1971

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Syracuse University Research Corporation, Merrill Lane, University Heights, Syracuse, New York 13210

HE 003 610

SYRACUSE UNIVERSITY

OFFICE OF THE DEAN | SCHOOL OF MANAGEMENT

116 COLLEGE PLACE | SYRACUSE, NEW YORK 13210

November 10, 1971

Dr. Stephen K. Bailey, Chairman
Policy Institute
Syracuse University Research Corporation
723 University Avenue
Syracuse, New York 13210

Re: External Degree Program

Dear Steve:

In compliance with the arrangements between our two units, I have attached the results of this faculty's efforts to produce the Business Administration portion of a total "external degree" package. As you are aware, this is a unique output, since this curricular plan is the first in this field developed to date. The Areas of Competency include all facets of the requirements which are specified by our accrediting agency, the American Association of Collegiate Schools of Business. This was done to preserve an approved content base for this offering. However, the faculty involved have been innovative in the approach employed to develop each area.

Please let me know if I can provide any editorial assist relative to this document. The faculty of this School has made a long-term commitment to the external degree concept, via its relationship with University College. We hope that we may serve this end with the Policy Institute in the future.

Sincerely,

Dick

L. RICHARD OLIKER
Associate Dean and
Project Director

LRO:mac

EXTERNAL DEGREE PROGRAM

AREAS OF COMPETENCY
IN
BUSINESS ADMINISTRATION

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INTRODUCTION

AN EXTERNAL DEGREE IN BUSINESS ADMINISTRATION

Less Time, More Options, a provocative report by the Carnegie Commission on Higher Education, calls for innovative action on the part of the educational community. The Commission recommends that "alternative avenues by which students can earn degrees or complete a major portion of their work for a degree be expanded to increase accessibility of higher education for those to whom it is now unavailable because of work schedules, geographic location, or responsibilities in the home."[1]

In recent years, a number of such developments have been initiated which have increased the flexibility of educational opportunities in a number of respects. The College Proficiency Examination Program (CPEP) and the College-Level Examination Program (CLEP), initiated in 1963 and 1965 respectively, provide academic credit by examination to a growing number of students in an increasing variety of subject-matter areas. The University of Oklahoma, Syracuse University, Goddard College and the University of South Florida have recently implemented programs which provide an opportunity to obtain a bachelor's degree largely through directed independent study.[2] This year, the inauguration of Britain's Open University has added 25,000 students pursuing a nation-wide, independent study degree to that country's college-going population.

The "external degree" concept in this country received considerable impetus when, in September 1970, Ewald B. Nyquist, inaugurated as Commissioner of Education and President of the University of the State of New York, announced plans to establish an external degree program in New York State. It will be based upon independent study in Business Administration validated by a series of comprehensive written and oral examinations developed by CPEP. These examinations will be prepared and evaluated by faculty committees drawn from both public and private institutions of higher learning throughout the State.

The external degree differs markedly from a typical correspondence study program. It can best be described as an independent study program, augmented to a given degree by tutorials or other types of formal instruction, where the peer group interaction does not necessarily have to take place on campus. Students can attend sessions at regular intervals at local study centers. The duration of contact between the students and instructor will be a product of both time and cost factors. The learning experience will be validated by performance on examinations prepared either by the corporate faculties of individual colleges or universities, or by a consortium of the faculties of such institutions. The quality, standards, and content of such a degree program thus remain the responsibility of professional members of the academic community.

Funds for the development of several innovative projects for external degree offerings in New York State have recently been provided by the Ford Foundation and the Carnegie Corporation. This series of grants, totaling $2.1 million,[3] will support three separate efforts.

1. The state-run program referred to above has been funded by matching grants of $400,000 from each foundation. The first set of examinations, leading to a Regents Degree in Business Administration, are expected to be prepared in 1972.
2. A non-residential college of the State University of New York (already being referred to as Empire State College, to be established along the lines of the British Open University concept. Ford and Carnegie have each provided $500,000 for this project, with an off-campus degree in liberal studies scheduled to open for the 1971-72 academic year.
3. A feasibility study for the implementation of an external degree in business administration for a five-county area in Upstate New York. The $300,000 Ford grant was made to the Syracuse University Research

Corporation. The faculty of the School of Management at Syracuse University will develop the prototype of the business portion of the external curriculum. It will be with this study that this paper will focus.

The nature of the curriculum for an external degree must, by its very nature, depart from the normal parameters associated with "courses" and "course credits. However, it should readily translate into these standard forms of reference in order to be of value to those students who transfer from this type of program to a residential one. The departure comes about as a result of the program design. The approach developed at Syracuse University is two-fold:

1. Courses with a common academic base have been grouped in modular form to reduce the Business Administration portion of the curriculum to a feasible number of subject-matter components.
2. Each such module will be referred to as an "Area of Compentency which is designed to encompass up to as many as twelve semester hours of academic credit.

Determination of each Area of Competency involves a detailed description of the learning experience which the candidate would have and the depth and degree of proficiency he should have received in that area. The basic concept of such an area as the unit upon which the validating testing instrument will be based is a novel, but not unique, development of the external degree idea. The current business administration curriculum at S.U. consists of 120 semester hours of credit, of which 54 are in business administration, 54 in liberal arts, and the remaining 12 are free electives. The "Area" approach implies modularization of this total degree package.

As a first iteration in defining the limits of the Areas of Competency in Business Administration, the following organization design has been employed:

TABLE I

TRANSITION FROM COURSES TO AREAS OF COMPETENCY

	EXISTING COURSE REFERENCE	CREDIT (Sem. Hrs.)	AREAS OF COMPETENCY
	Business Core		
1.	Accounting/Finance	12	Financial Information Systems
2.	Business Law/Public Policy/Prin. of Mgt.	9	Environmental Studies
3.	Marketing/Transportation/Opers. Mgt.	6	Logistics
4.	Statistics/Data Processing	9	Quantitative Analysis
	Fields of Concentration*		
5.	Accounting	9	Accounting
6.	Finance	9	Finance
7.	Marketing	9	Marketing
8.	Operations Management	9	Operations Management
9.	Personnel & Industrial Relations	9	Personnel & Indus. Relations
10.	Statistics	9	Advanced Quantitative Analysis

* These fields are equivalent to the degree of study which makes up a 'major' in the on-campus program.

The first four Areas of Competency encompass what is normally contained in the undergraduate business "core." At Syracuse University this core involves 36 semester hours of study (12 courses). Rather than develop 12 separate examinations, the Area organization allows for the validation of this learning experience through four comprehensive examinations. The entire business administration portion of the curriculum will involve the development of only ten such testing measures -- one for each Area. These Area parameters have been established because they follow a convenient packaging of the current curricular components. In addition, they provide for the partial utilization of existing course materials in a new permutation.

The Liberal Arts portion of the total curriculum is being developed by the faculty of Syracuse University already associated with the Bachelor of Liberal Studies Program. This program offers an independent study degree which has been in operation over the past five years and from which over 30 persons have already graduated. It has the following composition (in modular form):

TABLE II

BACHELOR OF LIBERAL STUDIES CURRICULUM

AREA	Module* and Years of Study			
	I	II	III	IV
Humanities	LS101	LS201	LS301	LS401
Mathematics	LS102	LS202	LS302	LS402
Social Science	LS104	LS204	LS304	LS404
Science				
Biological Science	LS105	LS205	LS305	LS405
Phisical Science	LS106	LS206	LS306	LS406

* Each module carries a specific Liberal Studies title and detailed description. For the sake of brevity, only the numbers are used here.

Each module above is equivalent to eight semester hours of study. For example, LS201 entitled The Renaissance and The Age of Reason involves study covering selections from Montaigne, Shakespeare, Cervantes, Milton, Hobbes, Discartes, Swift, Rousseau, Hume, and Goethe. It also includes Renaissance, Baroque, and Neo-Classical Art and Music. Liberal Studies 304 includes an Introduction to Economics covering macro and micro theory, economic organization and development, and stabilization and growth policy. Thus, what may have been encompassed within two or three normal "courses" can be contained in one such module. At least 15 modules must be completed in order to fulfill the degree requirements. Since the program is not designed for a major in any one of these areas, study in all four broad content areas is required.

It is the existence of this Bachelor of Liberal Studies Program at Syracuse University which provides a unique opportunity for the School of Management to develop an external degree in business administration. The experience gained in the operation of the former program and the ability of a corporate faculty to control its quality provides a clear rationale to pursue the development of an external degree in the latter field of study.

The meld of the modules comprising the Bachelor of Liberal Studies Program and those making up the Areas of Competency in Business Administration can be accomplished by meshing the two modular structures as depicted in Table III. The numbering sequence is a modification of that currently employed in the former program.

The actual content of each Area of Competency will be equivalent to eight semester hours of study. Four Areas -- Financial Information Systems, Environmental Studies, Logistics, and Quantitative Analysis -- will be required for all candidates. However, any three of the six Functional Fields may be elected, one in the third year and two in the fourth. Thus, a total of seven Areas will be taken in Business Administration (equivalent to 56 semester hours of study). Each candidate will also be required to complete study in all four Liberal Studies Areas, in which at least nine modules must be completed (equivalent to 72 semester hours of study). Each module does not, however, have to be completed in the order depicted in Table III. The presentation indicates only one possible permutation for an individual program. The previous academic background of the candidate, his professional management experience and career objectives will determine, to a great extent, the order in which modules may be completed. While this type of program offers only limited flexibility to the initial group of candidates, additional Areas may be added to the degree structure as warranted.

TABLE III

EXTERNAL DEGREE IN BUSINESS ADMINISTRATION

AREAS OF COMPETENCY	Years			
	I	II	III	IV
LIBERAL STUDIES				
Humanities	LS101(R)		LS201(R)	LS301/LS401(E)
Mathematics	LS102(R)	LS202(R)		LS302/LS402(E)
Social Science	LS104(R)	LS304(R)		LS404(E)
Science				
Biological Science	LS105			
Physical Science	LS106(R)			
BUSINESS ADMINISTRATION				
Financial Information Systems		FIS207(R)		
Environmental Studies			ES308(R)	
Logistics			LG309(R)	
Quantitative Analysis		QA210(R)		
Functional Fields*				
Accounting			ACC 411	
Finance			FIN 411	
Marketing			MAR 411	
Operations Management			OPM 411	
Personnel & Industrial Rel.			PIR 411	
Advanced Quantitative Analysis			AQA 411	

* One Functional Field must be elected in the third year and two in the fourth. (R = required and E = elective)

There are many ways in which curriculum development may be accomplished. In this instance, a task force of 16 members of the School of Management faculty is currently involved. The parameters of each Area are being carefully described and outlined, with detailed behavioral objectives defining the designed educational experience. Manpower overlaps from Area to Area to insure continuity of effort, reduce communication problems, limit redundancy and keep the size of the task force within reasonable bounds. The finished product will, in terms of its quality, structure and content, depend upon the professional efforts of the faculty members involved and the degree of their commitment to a new curriculum concept, the viability of which may still be very much a matter for debate.

The as-yet-unanswered question is "will such a degree be accepted at par (with residential degree programs) by both the business and academic communities?"

FOOTNOTES

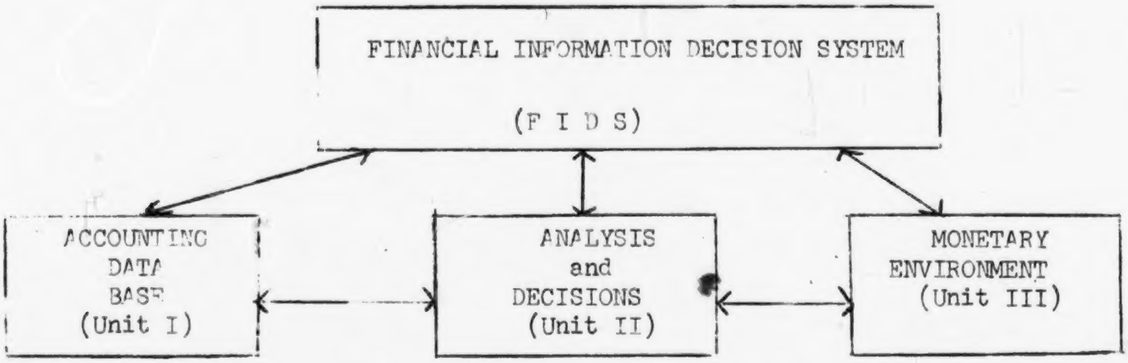
1. Less Time, More Options: Education Beyond the High School, A Special Report by the Carnegie Commission on Higher Education (New York: McGraw-Hill, January 1971), p. 20.
2. Less Time, More Options, p. 43.
3. Robert L. Jacobson, "N. Y. to Award Degree for Study Off Campuses," The Chronicle of Higher Education (Vol. 5, No. 2, February 22, 1971), pp. 1-2.

AREA I

FINANCIAL INFORMATION DECISION SYSTEM

EXTERNAL DEGREE PROGRAM

AREA OF COMPETENCY: FINANCIAL INFORMATION DECISION SYSTEM


FINANCIAL INFORMATION DECISION SYSTEM
(F I D S)
ACCOUNTING DATA BASE (Unit I)
ANALYSIS and DECISIONS (Unit II)
MONETARY ENVIRONMENT (Unit III)

Business organizations within our society succeed or fail depending upon the efficiency with which they acquire and manage the resources required for operations. The original input of resources in a firm is in the form of capital funds derived from investors. These funds are utilized in the market place to acquire physical facilities, services, and human skills. The success of the firm is inexorably related to the success of the managerial decision process within the business organization.

The process of reaching optimal decisions is based upon a system that collects, collates, summarizes, and reports the relevant data. It is this accounting system which provides the basic informational input for the business unit. Data systematically collected is then analyzed and interpreted by management as the second step in the financial decision process. The type of data collected and the technique of analysis utilized stem from the particular type of decision under consideration. In addition to evaluating information generated internally, managers must understand the constraints of the existing environmental framework of society. This requirement leads to a consideration of the factors which constitute the institutional arrangements within which business decisions must be executed. Specifically, this institutional framework is related intimately to government monetary and fiscal policies and procedures. The regulatory setting is also of vital importance. The student of management must therefore understand that financial decisions are reached based upon an internal data base which must be (1) interpreted and (2) analyzed in the light of the economic, institutional, and regulatory framework of the day. The three study units of the financial information decision process are directed toward providing the student with a basic understanding of (1) the structure and tenets of the accounting model as the data base (Unit I); (2) the techniques and goals of the analytical process in reaching financial decisions (Unit II); (3) the monetary and fiscal environment which influences these decisions (Unit III).

Unit I

Accounting Data Base

The objectives of accounting are to provide information for many purposes, but especially for the deployment and use of financial resources in entities and in the economy. Accounting information is most useful when it is presented in ways which conveniently summarize relevant information for decision makers. Over time certain concepts and formats for presenting accounting information have come into wide use. The framework on which financial statements are based rests on a substantial conceptual and theoretical structure. This study will provide the student with a basic understanding of the concepts and theories that underlie modern financial statements in order that he may function as a better decision maker.

Operational Objectives

The goal of understanding financial statements will be considered achieved if a student is able to:

(1) Prepare financial statements from a set of reasonably complex facts.

(2) Show how various financial events will affect the financial statements.

(3) Use financial statements in decision situations to demonstrate his understanding of them.

Unit II

Analysis and Decisions

The objectives of Unit II are to evaluate critically the relevancy of the financial information for internal decision-making at the firm level. The identification of managerial decisions as strategic and operational will facilitate the specification of information requirements for each decision. Capital budgeting and the structure of capital funds are dominant topics for strategic planning decisions. The master budget as a planning and control tool represents the backbone of the operational management control process.

Operational Objectives:

The student is required to demonstrate his understanding of the theoretical and practical dimensions of each topic to be covered. He should be able to:

(1) Discuss the basic theoretical concepts of capital budgeting.

(2) Discuss the considerations affecting the acquisition and management of long-term capital.

(3) Discuss the process of managing working capital.

(4) Discuss the process of developing the master budget.

(5) Identify how the master budget can be used as a control tool.

(6) Evaluate the impact of people on budgets.

Unit III

Monetary Environment

The broad objectives of Unit III are to (1) study the role that money plays in a modern economy and (2) provide an understanding of monetary policy and its effects on national income and personal living standards.

Operational Objectives:

To achieve the broad objective of the unit, the student must study and become familiar with the:

(1) History of monetary systems.

(2) Current structure of financial institutions in the United States.

(3) Elementary monetary theory.

(4) Policy strategies available to monetary authorities.

Monetary history is not emphasized for its own sake, but rather for the purpose of providing perspective on the current financial system and its possible future evolution. The business firm must function within the existing financial environment; thus knowledge of the current structure is required. Without the commercial banking system, business could not function as it does today. Thus the student must become familiar with the fundamentals of this system and with a broad theoretical model of its complex workings. Basic to the operation of the banking system and the national economy is the Federal Reserve System. Consequently, students are expected to become thoroughly familiar with the structure of the system and the tools of monetary policy. This basic understanding will provide for further study of complex questions of monetary theory and policy for those students who elect a finance concentration.

Unit I: Accounting Data Base

Outline

I. The Accounting Process

- A. Some basic concepts
  - 1. Accounting entity
  - 2. The accounting equation Assets = Equity
  - 3. Revenue, Expense, Asset, and Cost distinguished
  - 4. Stable monetary unit assumption
- B. Recording and Processing Information
  - 1. What events are recordable
  - 2. Methods of recording and classification
    - a. Accounts and codes
    - b. Journals - general and specialized
    - c. Ledgers - general and subsidiary ledger
  - 3. Computer and EDP applications to processing data
- C. Preparation of (Simple) Financial Statements
  - 1. Adjusting the accounts for changes:
    - a. In classification
    - b. New events unrecorded
  - 2. Format of the Balance Sheet
  - 3. Format of the Income Statement

II. Assets and Equities

- A. Assets
  - 1. Valuation concepts - cost, input and output values
  - 2. Current assets
  - 3. Long term assets - property, intangibles and leased assets
  - 4. Depreciation and amortization of assets
    - a. Cash, receivables and securities
    - b. Inventories - costing and valuation

B. Equities

  1. Liabilities - long term and current

  2. Ownership forms

    a. Corporation stock and retained earnings
    b. Proprietorship and partnership equities

III. Income Measurement

A. Revenue

  1. Definition of Income: Accounting and Economic

  2. Measurement of Revenue - realization versus earnings concepts

  3. Revenue recognition methods -

    a. Point of sale
    b. Cash vs. accrual
    c. Percentage completed contract
    d. Installment sale

B. Expense

  1. Definition - expired cost idea

  2. Cost flows vs. expenses - depreciation, inventory

  3. The asset expense problem - capitalization

IV. Financial Reporting

A. Disclosure and the CPA's opinion

B. Price level changes and financial reports

C. Consolidated financial statements

V. Funds Statement

A. Concept of funds - working capital and total resources

B. Analysis of funds flow

C. Preparation of the funds statements

VI. Analysis of Financial Statements

A. Usefulness of financial analysis

  1. An analytical tool of management

  2. An analytical tool for investors

B. Form of the analysis

  1. Comparison of data
  2. Need for standards
  3. Industry vs. internal standards
  4. Sources of information

C. Types of ratio comparisons

  1. Liquidity measures
  2. Profitability measures
  3. Coverage

Recommended Texts:

Thacker, Ronald J. Introduction to Modern Accounting, (Prentice-Hall, Inc., Englewood Cliffs, N.J.) 1971.

Anthony, Robert N. Essentials of Accounting (A programmed book), (Addison-Wesley Publishing Co., Inc., Reading, Mass.) 1964.

Bruns, William J. Jr. Introduction to Accounting, (Addison-Wesley Publishing Co., Inc., Reading, Mass.) 1971.

Meigs, Walter B., Charles E. Johnson et al, Intermediate Accounting (McGraw-Hill, Inc., New York, N.Y.) 2nd Edition, 1968.

Unit II: Analysis and Decisions

Outline

I. Introduction

- A. The role of financial management in the firm
- B. The nature and scope of the financial information in the firm
    - 1. Long-range planning
    - 2. Cost analysis and budgeting

II. Long-Range Planning of the Firm's Activities

- A. Long-range planning formation
    - 1. Organizational goals and objectives
    - 2. The usefulness of long-range planning
    - 3. The development of long-range plans and strategies
- B. Capital budgeting
    - 1. Cash flows
    - 2. Time value of money
    - 3. Estimating capital expenditures
    - 4. Estimating net returns
    - 5. Techniques for decision-making
        - a. Present-value
        - b. Internal rate of return
        - c. Payback
        - d. Accounting rate of return
- C. Cost of capital
    - 1. Basic characteristics of debt equity
        - a. Claims on income and assets
        - b. Maturity and management arrangements
    - 2. Cost of funds
        - a. Senior securities--bond and preferred stock
        - b. Residual funds--common stock and retained earnings
    - 3. Weighted average cost of capital

III. Acquisition and Management of Long-Term Funds

- A. Capital structure
    - 1. Planning an optimal structure
    - 2. Relationship to operating and financial leverage
    - 3. External and internal funds
    - 4. Income, risk and control factors

B. Considerations of capital acquisition

1. Public offerings

a. Nature and extent of use
b. Costs and terms
c. Regulations

2. Private placements

a. Terms
b. Advantages and disadvantages
c. Sources of funds

3. Privileged subscriptions

a. Rights issues
b. Value to stockholder and issuer

C. Sources of capital acquisition

1. Short-term loans and intermediate term funds

2. Long-term debt

a. Characteristics of Debt

1. Creditor status
2. Priority of claim on income
3. Priority of claim on assets

b. Types of bonds

1. Debentures: regular and subordinated
2. Mortgage and collateral bonds
3. Income and serial bonds
4. Convertibles

c. Security and repayment provisions

1. Sinking fund plans
2. Call provisions
3. Refunding arrangements

3. Preferred stock

a. Types of preferred stocks: cumulative, participating, convertible

b. Reasons for and extent of use of preferred stock

1. Advantages to corporation
2. Investor appeal

c. Rights of preferred stockholders

1. Claims on income and assets
2. Protective provisions

4. Common stock

a. Residual status

1. Claims on residual income and assets
2. Valuation: par, market, book value

b. Rights of common stockholders

1. Rights to elect directors
2. Voting arrangements
3. Right to inspect books

c. Warrants and conversions

5. Retained earnings

a. Types of dividends: cash, stock dividends and splits, combination dividends, regular and extra

b. Dividend policy

1. Legal limitations
2. Procedural arrangements
3. Market considerations

c. Growth through retained earnings

1. Expansion through retention
2. Interests of managers
3. Interests of owners

IV. Long-Range Planning through Mergers

A. Mergers and acquisitions

1. Reasons for combinations

2. Mergers and consolidations

3. Acquisitions

4. Techniques and terms

B. Failure and reorganization

1. Voluntary arrangements

2. Involuntary arrangements

3. Reorganization or liquidation

V. Planning and Management of Working Capital

A. Cash and marketable securities

1. Cash flows

a. Tracing cash movements
b. Original sources
c. Relationship to profits and depreciation allowance

2. Efficient cash management

a. Minimum requirements
b. Collection control techniques
c. Disbursement systems

3. Alternative uses of cash

a. Types of marketable securities
b. Certificates of deposit and repurchase agreements

4. Forecasting monthly cash flows

B. Receivables

1. Level required for operations

a. Control of investment in receivables
b. Relationship of credit policy to profits

2. Credit extension policy and criteria

a. Credit terms
b. Credit standards
c. Sources of information on applicants

3. Collection policy

a. Receivables turnover
b. Cost of discounts and losses
c. Estimating probabilities of losses

C. Inventory

1. Inventory costs

a. Investment in inventories
b. Space and service costs
c. Inventory risks

2. Control techniques

a. Economic order quantity
b. Safety stocks
c. Application stocks

3. Relationship to overall financial requirements

a. Stock-outs versus inventory costs
b. Impact of delivery and production factors
c. Evaluation of inventory system

VI. Managerial Accounting System for Planning: Master Budget

A. Characteristics of budgets--definition of budget, advantages of budgets

B. The preparation of a master budget

1. Time span

2. Flexible vs. static budgets

3. Formalization of the planning procedure

4. The development of sales budget, production budget, etc.

5. Coordination and communication

C. Impact of people on budgets

1. Human relations impact on budget

2. Budget presence on human performance

VII. Cost-Volume--Profit Analysis

A. Cost concepts

1. Variable vs. fixed costs

2. Committed costs, managed costs

B. Cost measurement of variable and fixed costs

1. The high-low two point method

2. Engineering methods

3. Statistical methods

C. Assumptions underlying break-even analysis

D. Calculation of break-even point (or range)

1. For one product, two products, multiple products

2. Analysis and manipulation of break-even for changes in the parameters

E. Uses and limitations of cost-volume profit analysis

VIII. Standards and Flexible Budgeting for Control

- A. Standards and forecasting
- B. Types of standards
- C. The relationship between standards and budget
- D. Standards as measures of efficiency
- E. The control process and essence of control
- F. The usefulness of flexible budgeting in the control process

IX. Analysis of Variances--A Part of the Control Process

- A. Material variances--price variance, quantity variance
- B. Labor variances--labor rate variance, labor efficiency variance
- C. Measuring capacity and the choice of capacity level for control
- D. Control of capacity--expected idle capacity variance, volume variance
- E. Measuring effectiveness variances in dollars rather than physical measures
  - 1. Limitations of monetary measures
  - 2. Using contribution margins as approximations of opportunity costs
- F. Analysis of overhead variances

X. Responsibility Accounting System

- A. Characteristics of responsibility accounting
- B. Controllable and non-controllable costs
  - 1. Distinguishing features of controllability
  - 2. Assigning costs to individual managers
- C. Cost allocation for the purpose of a responsibility accounting system
  - 1. The factors influencing the question to allocate
  - 2. The behavioral consequences of full allocation

XI. The Contribution Margin Approach and Net Profit Approach

- A. The characteristics and usefulness of each approach
- B. The limitations of each approach

C. The contribution margin approach and production decisions

D. The contribution margin approach and marketing decisions

XII. Financial Surrogates and Measuring Divisional Performance

A. The impact of management accounting systems on divisional behavior

1. Accounting information as motivation devices

2. Organizational goals and accounting information

3. Divisional pressure and manipulating divisional accounting reports

B. Profit centers and cost centers

1. Measurement problems of assets, capital

2. The rules governing divisional reporting of income

C. Financial indicators of divisional performance

1. Rate of return on investment--advantages and weaknesses

2. Controllable profit--budgeted or actual

3. Residual income

D. Transfer pricing

1. Methods for pricing transfer goods--cost, market price, negotiated prices

2. Implications of divisional income and measuring divisional performance

XIII. Relevant Costing

A. The kind of data needed for special decisions

B. Meaning of relevant costing

C. The type of decisions for which relevant costing is relevant

1. Deletion or addition of products or departments

2. Make or buy

3. Replacement of old machines

4. Pricing decisions

XIV. Product Costing and Product Pricing

A. Job order and process costing

B. Absorption costing for product costing system

C. Direct costing for product costing system

D. Standard costing for product costing system

E. The economist's views on pricing and the relevance of product costing

Recommended Texts:

Van Horne, James C. Fundamentals of Financial Management, (Prentice-Hall, Inc., Englewood Cliffs, N.J.) 1971.

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Unit III: Monetary Environment

I. Money and Credit

  A. Money and the Economic System

    1. Definition
    2. Money and the Unit of Account
    3. Money, Assets, and Liquidity

      a. Money and wealth
      b. Money and liquidity
      c. Reasons for holding money

    4. The Role of Money

      a. The importance of money in the economic system
      b. Rudimentary monetary analysis

  B. Money Types and Standards

    1. Kinds of Money

      a. Physical types
      b. Full-bodied and token money
      c. Legal tender money

    2. Monetary Standards

      a. Commodity standards
      b. Non-commodity or paper standards
      c. The importance of the monetary standard

    3. Monetary Developments

      a. Usefulness versus uselessness
      b. From commodity money to debt money
      c. Changing conceptions concerning desirable monetary qualities

  C. The Present Monetary Structure of the United States

    1. Legal and Administrative Organization
    2. The Monetary Standard
    3. The Money Supply of the United States

      a. Varying definitions, M_1, M_2, M_3
      b. The significance of the aggregates
      c. The role of near moneys

D. Credit and Credit Instruments

1. Nature and Functions of Credit Instruments

a. Debt and credit
b. Credit instruments as a device for transferring control over money

2. Types of Credit Transactions
3. The Importance of Self-Liquidating Credit Instruments
4. Credit Instruments of Major Importance to Banking

a. Notes, drafts, and governments
b. Checks, certified checks, and cashiers' checks
c. Collateral loans
d. Term loans
e. Other types

5. The Credit System

a. The layering of claims
b. Maintenance of the continuity of credit relationships
c. Credit and economic stability

6. Price-Yield Relationships

a. Market price and yield
b. Price-yield relationships for a Treasury bill
c. Price-yield relationships for a "consol"
d. Market prices and maturity
e. Reconciliation of the coupon rate with the market yield
f. Yield Curves

II. Commercial Banks and Related Institutions

A. Nature, Functions and Operations of Commercial Banks

1. Functions of Commercial Banks

a. The commercial banking business
b. The structure of commercial banking in the United States

2. The Process of Money Creation

a. Cash flows and deposit changes
b. The lending process and the creation of derivative deposits
c. Interbank deposit transfers

3. The Theories of Commercial Banking

a. Traditional - Assumed adjustment of money supply to "needs of trade"
b. Modern

B. Commercial Bank Deposit Expansion

1. Bank Reserves
    a. Definition and implication
    b. Legal and nonlegal reserves
    c. The functions of bank reserves

2. The Reserve Ratio
    a. Fractional reserves
    b. The minimum reserve ratio as a limit to deposit expansion

3. Cash Drain
4. Expansion Limits
    a. Expansion limits of banking system with no external drain
    b. Expansion limits of a banking system with an external drain
    c. Time deposits, financial intermediaries, and demand deposit expansion
    d. Actual versus potential deposits: the role of excess reserves
    e. Expansion limits of an individual bank within a system of many banks
    f. Qualifications relating to the expansion of the individual bank

C. The Bank as a Business Enterprise

1. The Fundamental Banking Problem: Profitability vs. Liquidity
2. Management of Bank Liabilities
    a. Deposit liabilities
    b. Nondeposit debt liabilities
    c. Liabilities to stockholders

3. Management of Bank Assets
    a. The schedule of priorities
    b. Criteria of portfolio policy
    c. Portfolio policy alternatives
    d. Particular devices affecting bank assets

D. Money Markets and the Adjustment of Liquidity Requirements

1. The Money Market in Relation to other Financial Markets
2. Development of the Money Market and Money Market Instruments
3. Organization of the Money Market
4. Interest Rates
5. Adjustment of Liquidity Needs

E. Other Financial Institutions

1. The General Functions of Financial Institutions
2. Specific Services Performed by Financial Institutions
    a. Provision of circulating medium
    b. Expert management and administration
    c. Information and advice
    d. Facilitation of diversification

        - e. Provision of savings facilities
        - f. Acting as intermediaries in security distribution
        - g. Lending facilities

    3. Financial Services of the Federal Government

        - a. Development of lending activities
        - b. Major services provided

III. Historical Background of Modern Monetary and Banking Developments

- A. The Currency History of the United States to 1900

    1. Gresham's Law in American Monetary History
    2. The First Period of Legal Bimetallism, 1792-1834
    3. The Second Period of Legal Bimetallism, 1834-1873
    4. The Period of the Legal Gold Standard

- B. Historical Background of the American Banking System

    1. Banking Developments Before 1860

        - a. The First Bank of the United States, 1791-1811
        - b. The Second Bank of the United States, 1816-1836
        - c. Other Banking Systems and early developments

    2. The National Banking System

        - a. Origin
        - b. Later history
        - c. Accomplishments and major defects

    3. Central Banking Functions before the Federal Reserve

        - a. Activities of the Secretary of the Treasury
        - b. Banking substitutes for central bank functions

IV. The Federal Reserve System and Instruments of Monetary Management

- A. Structure and Functions of the Federal Reserve System

    1. Organization of the Federal Reserve System

        - a. Board of Governors
        - b. The Federal Reserve Banks
        - c. The Federal Open Market Committee
        - d. Federal Advisory Council
        - e. Member banks

2. Functions of the Federal Reserve Banks
    a. Control of credit and stabilization of business conditions
    b. Bankers' banks
    c. Banks for the government
    d. Clearing and collection
    e. Regulation and supervision
    f. Miscellaneous

B. Instruments of Federal Reserve Monetary Management

1. The General Instruments of Monetary Control
    a. The discount mechanism
    b. Open-market operations
    c. Changes in reserve requirements
    d. Limits to Federal Reserve credit expansion

2. The Selective Instruments of Credit Control
    a. Margin requirements
    b. Control of consumer credit
    c. Control of real estate credit

C. Treasury and Other Influences on Bank Reserves: The Reserve Equation

1. Treasury Instruments of Monetary Management
    a. Treasury currency issues
    b. Treasury management of its cash balances

2. Other Major Factors Affecting Bank Reserves
    a. Gold purchases and sales
    b. Currency in circulation

3. Sources and Uses of Reserve Funds
    a. The reserve equation
    b. Determination of the volume of member bank reserves

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AREA II

ENVIRONMENTAL STUDIES

AREA OF COMPETENCY

Environmental Studies

Involves an analysis of the development of the corporate enterprise in this country, its conduct, the internal and external environment in which it must operate, and the various elements which foster, condition and/or restrict its unlimited growth and operation

LEGAL ENVIRONMENT	←→ MANAGEMENT ←→	PUBLIC POLICY
1. The Corporate Concept	1. History and Growth of Management in the United States	1. The Political Environment
2. Agency Doctrines	2. Three Approaches to the Development of Management Thought	2. Business - Government Relations
3. Corporate Management and Control	3. The Social Environment of Business	3. Regulation of Competition (Anti-Trust, Consumerism, etc.)

AREA TEAM: Professor John W. Collins
Professor L. Richard Oliker
Professor Malcolm D. Schlusberg

Environmental Studies

The business enterprise, regardless of its structure (proprietorship, partnership, or corporation), operates in a constantly evolving environment. This Area is designed to provide an appreciation for this evolution and the internal and external factors which condition and/or impinge upon the unrestricted operation of the business sector. As in the case with the other Areas of Competency comprising this "external" degree, the content will be roughly equivalent to eight or nine semester hours of study.

The development of the professional manager and the corporate enterprise, the relationship between the two and the operation of both as part of a larger societal environment has been the subject of much writing and research. Every student of management should be aware of these relationships. This Area encompasses materials which may be grouped under these major sections:

I. The Legal Environment of Business

II. The Development and Operation of Business Management

III. The Political Environment and Public Policies Toward Business

I. The Legal Environment of Business

The most important form of American business enterprise is the corporation. The effective business manager should understand the legal nature of the corporation and the rights, duties and powers of various parties affiliated with the corporate enterprise.

Creation of a corporation requires sanction by the government. Once sanctioned, the law treats the corporation as a separate legal entity. The entity status shields the shareholder from liability imposed on the corporation. However, in exceptional cases courts will decide that justice requires that they ignore the separate entity and impose liability directly upon share-holders.

Managers should understand the separate entity concept and the ways in which it facilitates and constrains the business activities of the corporation.

As a fictitious entity, recognized by law, a corporation can only act through agents. Employees can impose tort, contract and criminal liability on a corporation. Managers should comprehend the principal - agent relationship and the circumstances under which agents may impose liability on the corporation.

Most significantly, the managers must know of the rights, duties and powers of shareholders, directors and officers. Actions by members of each of these groups is limited and can only be exercised when certain procedures are followed. Duties of care, loyalty and disclosure are imposed under certain circumstances. The legal interrelationship of stockholders, directors and officers will contribute to the determination of where within the corporation decision-making power is located. The evolution of this power,its application in a corporate setting, and its societal impact are viable aspects of business operations which must be considered on the part of all managers.

II. The Development and Operation of Business Management

Management has evolved as a distinct and identifiable intellectual activity that lends itself to study, research, experimentation, teaching and practice. Its development indicates a chronological relationship to the evolution of the economic and industrial climate of the countries where it originated and flourished. In this country, the genesis of management thought was from the operative or work force area (via Scientific Management); in Europe it was from the executive level of general administrative management. This development resulted from contributions of certain disciplines such as engineering, economics, mathematics, psychology and sociology. Management thought is now capable of contributing concepts and ideas in return to these disciplines which nourished its origin and growth.

Economic, social, and political systems always exist within organized society, and reciprocating institutional forces are constantly at work. A choice of objectives for business firms must be made which are economically, socially, and legally justifiable and acceptable to organized society. Professional managers, owners, or some type of leadership must be able to successfully employ some process of decision making to choose the objectives necessary for the survival of the enterprise within its specific environment.

Facilitating aids to decision making in choosing courses of action are: (1) a basic process for acquiring and ordering the resources required for the operation of the firm; (2) aspects of the behavioral sciences which can be utilized for dealing with problems arising with the human resources of the firm; and (3) techniques and strategies for problem solving, such as operations research tools and management science methods.

Managerial decision making must be accomplished in a manner which acknowledges the firm's recognition of its responsibility to various constituencies such as owners, stockholders, creditors, customers and the general public. Decisions involving capital, material and human resources are subject to certain constraints imposed by various government agencies. The firm thus operates in an environment which is subject to both established and changing parameters.

III. The Political Environment and Public Policies Toward Business

Public policy also plays an important role in the direction of the business economy and the parameters it poses for managerial decision-making. Public policy in this context refers to the output of the legal and political systems that have a great impact on the total environment in which the business firm operates.

In order to comprehend this impact, it is first necessary to understand the political process from which it emanates. This requires some knowledge of those political institutions that are engaged in the policy making process, and, more importantly, of the forces that operate upon those institutions. The American political system is perhaps best described as pluralistic, and it is important for managers to have an awareness of how power is distributed within the system and the kinds of influences that are brought to bear on policies, rules and decisions enforced by governmental processes. It is necessary that the manager further understand that business itself is a major actor (or more specifically a collection of major actors)within the political process with potentially substantial impact on this segment of the environment.

The basic assumption of American public policy towards business is that the private firm is the normal means for the distribution of goods and services to the public, but that it is appropriate for the government to intervene when deemed essential to redress imbalances and to serve the public interest, as that becomes defined in the political process. It is important to understand that government and the business community have become increasingly interdependent, and that public intervention is supplemental and facilitative as well as prescriptive and corrective. The multiple and varied aspects of business-government relations must be considered, with the impact of government described in terms of both its promotional and regulatory roles.

The manager must be specifically aware of those particular rules and policies that pose parameters on his conduct of the firm. The final segment of the section on public policy describes in some detail how government controls competitive practices through operation of the anti-trust laws and other statutes that regulate trade and competitive practices. The content of that regulation must be viewed in terms of its social and political inputs as well as formal legal processes and subsequent economic impact. The segment is concluded with an examination of recent trends in regulation and an analysis of the prospective future directions.

OBJECTIVES

I. The Legal Environment of Business

The primary objectives of this segment of the Area are to provide an understanding of the corporate concept, the role of agents *vis a vis* the corporation, and the rights, duties and liabilities of corporate shareholders, directors and officers.

The student will be expected to be able to:

1. Define the corporate concept and distinguish the corporation from other forms of business enterprise.
2. Analyse the advantages and disadvantages of incorporation of a business enterprise.
3. Describe the basic steps of incorporation.
4. Demonstrate an understanding of the term "close corporation" and describe the legal significance of such an enterprise.
5. Recognize the business and legal status of the corporate promoter.
6. Define the principal-agent relationship and to describe its legal significance.
7. Describe the various sources of authority of an agent.
8. Define the agency doctrine of *respondent superior*.
9. Trace the necessary legal steps for valid action by corporate shareholders.
10. Trace the necessary legal steps for valid action by corporate directors.
11. Demonstrate an understanding of the process of voting by shareholders.
12. Describe the division of power between shareholders and directors.
13. Analyse various methods of delegating corporate power by directors.
14. Describe the problem of corporate deadlock and varying means of resolving such deadlock.

15. Understand the duties of officers, directors and controlling shareholders.

16. Describe the duty of care owed by officers and directors and the parameters of such duty.

17. Define the duty of loyalty of officers and directors and describe the situations in which such a duty comes into question.

18. Describe the duties of controlling shareholders to minority shareholders.

19. Analyse the problem of trading in corporate shares by persons with "inside" information.

II. The Development and Operation of Business Management

The basic purpose of this segment of the Area is to provide an understanding of the process of management, the behavior of individuals within organizations and the consequent effects of organization upon individuals, and the application of management techniques for decision making and problem solving.

The student will be expected to be able to:

20. Describe the genesis and evolution of the four indentifiable stages in the development of management thought in the United States.

21. Define Scientific Management in terms of the several functions inherent in its operation.

22. Describe the management process, list and define its four basic elements and discuss several applications of the process to given management situations.

23. Demonstrate a sensitivity to the impact of organization upon the human resources of the firm and describe the results of the Hawthorne Studies which led to the recognition of the reaction of the work force to organization.

24. Define a "hierarchy of needs" and describe at least five dys-functional aspects of the non-satisfaction of such needs.

25. Demonstrate an awareness of the various types of motivational techniques available for managerial use by listing at least four and discussing their application to given situations.

26. Discuss the place of authority, accountability and responsibility in an organization on one hand and power, influence, and status on the other.

27. Recognize and define various leadership theories and styles (at least three of each).

28. Discuss given organizational objectives and the means by which they may be accomplished.

29. Define the process for implementing organizational change.

30. Trace the development of systems management and describe its broad value in terms of the interaction of complex organizations.

31. Describe the decision-making process and the requirements for and timing of informational inputs and communications in this process.

32. Discuss the application of at least six (6) contemporary decision-making techniques, some of which may be specific operations research tools.

33. Discuss the relationship and apparent conflicts between the three approaches to management thought.

34. Critically analyse the social responsibility concept of management in today's society.

35. Demonstrate an awareness of the economic, legal and social factors which impinge upon the unrestricted operation of the firm.

III. The Political Environment and Public Policies Toward Business

The primary emphasis is to give the student a basic understanding of the political environment, an awareness of the role public policy plays in the direction of the business economy, and knowledge of specific legal and regulatory parameters on the conduct of the firm.

The student will be expected to:

36. Define the nature of the political process in American society.

37. Recognize the distribution of political resources and the basis of power and influence in American politics.

38. Describe the role played in the public policy process by the relevant political institutions.

39. Trace the development and impact of interest groups on the public policy-making process.

40. Critically analyse the role of business within the political environment.

41. Demonstrate an awareness of the nature and scope of business government relations.

42. Trace the development of political and legal responses to the problems of a complex industrial society.

43. Understand distinctions between business regulation and economic planning, and also between government interference and facilitation of business.

44. Recognize the administrative framework of agencies and procedures within which regulation takes place.

45. Recognize the role of government as manager within the economy, as promoter and facilitator of business, as a regulator of business practices, and as a framer of the economic environment through its contracting and procurement policies.

46. Project future developments in Business-government relations.

47. Demonstrate a sensitivity to the relationship of industrial organization to the demands of public policy (kinds and degrees of competition, etc.)

48. List and describe the primary legislative statutes regulating competition.

49. Recognize the current status of government policy towards mergers, acquisitions, and consolidations, and demonstrate an awareness of problems such as measuring concentration and determining the relevant market.

50. List and critically analyse current guidelines set forth by government agencies regarding mergers and acquisitions.

51. Recognize, describe, and critically analyse the major components of trade regulation including rules covering price fixing, price discrimination, tying agreements, unfair and fraudulant trade practices, etc.

52. Trace recent developments in consumer protection by the government.

53. Discuss the agencies, procedures, and sanctions involved in the enforcement of anti-trust and trade regulation.

54. Recognize and critically analyse the principal problems and policy decisions involved in the enforcement process of anti-trust and trade regulation.

55. Recognize and critically analyse current trends in anti-trust and trade regulation, and to project potential future developments in the regulation of competition.

ENVIRONMENTAL STUDIES

I. The Corporate Concept

    A. Alternative Forms of Enterprise - The Decision to Incorporate

        1. Individual Proprietorship

        2. Partnership

        3. Corporation

    B. Creation of the Corporation

        1. Essential Steps

            a. Certificate of Incorporation

            b. By-Laws

            c. Organizational Meetings

        2. Defectively Created Corporation

    C. Characteristics of the Properly Created Corporation

        1. Entity Theory

            a. Limited Liability

            b. Piercing the Corporate Veil

            c. Limited Corporate Power

            d. "Person" or "Citizen" Status within Constitutional and Statutory Provisions

        2. Close Corporations

    D. Pre-Incorporation Promoter's Contracts

        1. Practical Problems of Obtaining Pre-Incorporation Contracts

        2. Promoter's Liability

        3. Corporation's Liability

II. Agency Doctrines

    A. Corporations Can Act Only Through Agents

B. The Principal - Agent Relationship

  1. Creation
  2. Utility
  3. Rights and Duties of Parties
  4. Termination

C. Liability of Principal to Third Parties

  1. Contractual Liability
    a. Express Authority
    b. Implied Authority
    c. Apparent Authority
    d. Ratification
  2. Tort Liability
    a. Nature of Liability (Respondent Superior)
    b. Scope of Employment
  3. Criminal Liability

III. Corporation Management and Control

A. Action by Officers

  1. Sources of Authority
  2. Authority of Particular Officers
  3. Authority for Particular Actions

B. Action by Directors

  1. Power to Board, not Individual Directors
  2. Meeting Requirements
    a. Notice
    b. Quorum
    c. Vote
    d. Records

C. Action by Shareholders

  1. Meetings

    a. Annual and Special

    b. Notice and Quorum Requirements

  2. Voting

    a. Non-voting Stock

    b. Record Dates

    c. Proxy System

    d. Cumulative Voting

    e. Class Voting

  3. Particular Actions

    a. Mandates to Directors - Limitation of Shareholder Power

    b. Election of Directors

    c. Removal of Directors

      (1) "At will" or "With Cause"

      (2) Filling Director Vacancies

    d. By-Law and Charter Amendments

D. Delegation of Management and Control

  1. Shareholder Agreements

  2. Executive Committees

  3. Management Contracts

  4. Long-Term Employment Contracts

E. Management Deadlock

  1. How Deadlock Arises

  2. Dissolution

F. Duties of Management and Controlling Shareholders

1. Duty of Care of Officers and Directors

a. Negligence Concept

(1) Standard of Care

(2) Causality

b. Business Judgment Rule

c. Indemnification for Legal Expenses

2. Duty of Loyalty of Officers and Directors

a. Fiduciary Concept

b. Corporate Opportunity

c. Competing with Corporation

d. Dealing with Corporation

e. Interlocking Directorships

3. Duty of Controlling Shareholders

a. Extent of Duty

b. Discharge of Duty

4. Transactions in Shares by Directors and Controlling Shareholders

a. Common Law Rules

b. Federal Legislation concerning disclosure of "inside" information

c. Sale of Corporate Control

IV. The Development of Management Thought

A. The Evolution of Management Thought in the United States

1. The Internal Environment - Managerial Evolution in the Firm

2. The External Environment - Managerial Evolution in a Societal Setting (Involves the interaction and development of the Division of Labor, the Protestant Ethic, Social Darwinism, Organized Labor, etc.)

- B. The Social Impact of Organization
    - 1. The Individual Within-On-the-job and Off-the-job Satisfactions
    - 2. Economic Effects of Industrial Organization
- C. Three Approaches to the Development of Management Thought
    - 1. The Traditional Approach
    - 2. The Behavioral Approach
    - 3. The Systems Approach
- D. The Future for Developments in Management

V. The Traditional Approach

- A. Scientific Management
    - 1. Source and Development of Scientific Management
    - 2. Contributors to Scientific Management (Includes Taylor, the Babbage, Gilbreths, Fayol, Gantt, Emerson, Towne, etc.)
    - 3. The Functions of Scientific Management
        - a. Time and Motion Study
        - b. Wage Systems and Work Incentives
        - c. Preparation of the Work Force
- B. The Management Process
    - 1. Planning
        - a. Identification and Ranking of Objectives
        - b. Measurement of Objectives
        - c. Forecasting - Future Alternatives
        - d. Timing and Implementation of Planned Objectives
    - 2. Organizing
        - a. Traditional Principles of Organization

          (Useful only as first approximations in the organizing function - are generalizations which relate to human areas in any organization and involve Unity of Command, The "Exception Principle," Span of Control, Departmentalization, Decentralization, etc.)

b. Functionalization

(a) Formal Organizations

(b) Informal Organizations

3. Motivating

(To be covered in detail in Section IV, introduced only as part of the Management Process)

a. The Need for Motivational Incentives Within Complex Organizations

b. Maslow: The Hierarchy of Needs

c. "Parkinson's Law," "The Peter Principle," and "One Upmanship"

4. Controlling

a. The Required Environment for Control

b. Control of Resources

c. Feedback Loops in Control Mechanisms

VI. The Behavioral Approach

A. Foundations of Human Behavior

1. The Hawthorne Studies

2. Applications of the Behavioral Sciences to Management Situations

B. Motivation and Behavior

1. Maslow, Herzberg and Need Satisfaction

2. Dysfunctional Aspects of the Non-Satisfaction of Needs

a. Defensive Behavior Patterns (Involves Withdrawal, Compensation, Repressions, etc.)

b. Conflict Within the Informal Organization

c. Managerial Obsolescence

        3. Motivational Techniques
            a. Management by Objectives
            b. Participatory Management
            c. Job Enrichment
            d. The Management Audit
    C. The Informal Organization
        1. The Basis for Group Formation
        2. Types of Groups in Organizations
        3. Characteristics of Group Operation (Role, Status, Norms, Sanctions, etc.)
    D. Organizational Leadership
        1. Power and Influence as Characterizations of Leadership
        2. Leadership Theories (Trait, Situational, and Personal Behavior)
        3. Leadership Styles and Categorizations (The Managerial Grid, The House Model, The Likert Scale, Sensitivity Training)
    E. Organizational Development and Change
        1. Organizational Objectives
        2. Organizational Control (Technological versus Man-Made Elements of Control)
        3. The Management of Change (The Environment for Change, Recognition of the Need for Change, Problem Recognition, Alternatives, Selection of Strategies, Implementation, Control of Change)

VII. The Systems Approach
    A. Aspects of Systems Management
        1. Uses and Types of Techniques

        2. Development of a System
            a. Determining Systems Requirements
            b. Design of a New System
    B. Decision Making
        1. The Decision-Making Environment (Certainty, Uncertainty, Risk)
        2. The Process of Decision Making (The Intelligence, Design and Choice Activities)
        3. Information and Communications Systems
        4. Application of Specific Decision-Making Techniques (Break Even Analysis, Operations Research Tools, Heuristic Problem Solving,Etc.)
    C. Human Problems of Systems Management
    D. Synthesis of the Three Approaches to Management Development (As an Integrated System)

VIII. The External Environment
    A. Social Responsibilities of Management
        1. Business Ethics and Legal Parameters
        2. Community Needs
        3. Business Responses
            a. Involvement in Social Problems
            b. Dimensions of Corporate Philanthropy
        4. The Assessment of Responsibility
            a. The Problem of Accountability
    B. External Restraints
        1. Sociological
        2. Economic
        3. Political

IX. The Political Environment

- A. The Political Process
  - 1. The Meaning of Politics: "Who get what, when, how"
  - 2. Legitimacy and Authority: The Role of the State
  - 3. The Distribution of Political Resources
  - 4. Power and Influence
  - 5. Political Values in the American Context
- B. American Political Institutions
  - 1. The Federal Government
    - a. The Presidency
    - b. The Congress
    - c. The Judiciary
    - d. The Bureaucracy
  - 2. Federalism and Decentralized Political Decision-making
- C. Pluralism: Interest Groups and Governmental Processes
  - 1. The Nature, Scope and Function of Interest Groups
  - 2. Potential Interests and "The rules of the game"
  - 3. Policy Making Within the Pluralist Model
    - a. Bargaining and Coalition Formation
    - b. Socialization of Conflict and Accomodation of Interests
    - c. Problems of Access to the Political Process
- D. Business Participation in the Political Process (Anticipatory and Reactive)
  - 1. Participation in Electoral Politics
  - 2. Participation in Governmental Politics (Public Policy Decision-making)

X. Business Government Relations
  A. Nature and Scope of the Business-Government Interface
    1. From Laissez Faire to "The New Industrial State"; the Development of Democratic Responses to the Problems of a Complex Industrial Society
      a. Balancing Economic and Social Interests
      b. The Distinction Between Business Regulation and Economic Planning
      c. The Distinction Between Government Interference and Facilitation Business
    2. Federal and State Regulation of Commerce
    3. Taxation of Business
    4. The Administrative Framework: Agencies and Procedures
  B. Government as manager
    1. Managing the Economy
      a. Assuring Aggregate Demand, Economic Security, and Economic Stability
    2. Managing Natural Resources
      a. Resource Conservation
      b. Environmental Quality Protection
    3. Managing Public Services and Enterprises
      a. Competition with Private Business
      b. New Developments: Comsat, Amtrack, etc.
  C. Government as Promoter and Facilitator of Business
    1. Grants, Subsidies and Trade Policies
    2. Tax Benefits (research, development, resource utilization, etc.)

3. Services to Business (everything from building roads and airports to furnishing economic statistics and weather forecasts)
4. Small Business Assistance
5. Loans, Guarantees and Insurance Programs
6. Protecting Proprietary Interests: Licensing, Franchises, Patents, Trademarks, etc.

D. Government as regulator of business
   1. Anti-trust, Trade Regulation and Consumer Protection (brief survey--covered in detail in XI below)
   2. Public Utilities
   3. Transportation and Communication
   4. Banking, Securities and Insurance
   5. Labor Organizations
   6. Employment Practices
   7. Environmental Despoliation

E. Government as Buyer
   1. Scope and Impact of Government Purchases and Contracting
   2. Procurement as Regulation (employment practices, stockpiling, etc.)
   3. Contracting out of Public Functions
      a. Concern with the Military-Industrial Complex

F. Projecting Future Developments in Business-Government Relations

XI. Regulation of Competition (Anti-trust and trade regulation)

A. Industrial Organization and Public Policy
   1. Monopoly and Oligopoly
   2. Competition (perfect, workable, effective, and free)

    3. Legal Responses Under the Common Law
    4. The Statutory Response
        a. Sherman, Clayton, Robinson Patman, etc.

B. Mergers, Acquisitions and Consolidations

    1. Forbidden Practices - Vertical and Horizontal
        a. Measuring Concentration
        b. Determining the Relevant Market
    2. Conglomerate and Product Extension Mergers
        a. Potential Competitors and Trade Practices
    3. Mergers in Regulated Industries and Exemptions from Anti-trust
    4. Development of Contemporary Guidelines and Restrictions

C. Trade Regulation

    1. Combinations and Agreements to Exclude Competitors and Exchange Information
    2. Price Fixing (prohibitions and exceptions)
    3. Price Discrimination (prohibitions and exceptions)
    4. Tying Contracts and Exclusive Dealings
    5. Resale Price Maintenance
    6. Unfair and Fraudulant Trade Practices
    7. Advertising, Labeling, and Disclosure
    8. Special Concerns (foods, drugs, etc.)
    9. Recent Developments in Consumer Protection

D. Enforcement of Anti-Trust and Trade Regulation

    1. Agencies Involved
        a. FTC, Justice Dept., and Other Federal and State Regulatory Bodies
        b. Problem of Uniformity and Coordination of Enforcement Policies

2. Judicial Forums and Legal Proceedings
3. Sanctions
    a. Regulation as a Corrective Device
    b. Regulation as a Deterrent Measure
4. Problems in Defining the Public Interest in Anti-Trust and Trade Regulation
    a. Who should be Protected: Competitors, Competition, or Consumers?
5. Political Inputs into Enforcement Decisions

E. Projecting Future Developments in the Regulation of Competition

1. Class Actions and an Expanded Role for the Courts
2. Legislative and Administrative Developments

ENVIRONMENTAL STUDIES

BIBLIOGRAPHY

I. The Legal Environment of Business

Text:

Kempin and Wiesen, Legal Aspects of Management Process (St. Paul, Minnesota: West Publishing Co., 1969)

Supplementary or alternate texts:

Cary, Cases and Materials on Corporations, Fourth Edition - Abridged (Mineaola, New York: The Foundation Press, Inc., 1970)

Frascona, Agency (Englewood Cliffs: New Jersey, Prentice-Hall, Inc., 1964)

Votaw, Modern Corporations (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1965)

II. The Development and Operation of Business Management

INSTRUCTIONAL PACKAGES (Alternatives A, B, or C)

A. Donnelly, Gibson, Ivancevich, Fundamentals of Mangement (Austin, Texas: Business Publications, Inc., 1971) Text and Readings Books.

Terry, George R., Principles of Management Programmed Learning Aid (Homewood, Illinois: Learning Systems Co., 1971).

B. Kazmier, Leonard J., Principles of Management: A Program of Self-Instruction (New York: McGraw-Hill Co., 1969).

Massie, Joseph L., Essentials of Mangement (New YOrk: Prentice-Hall, INc., Second Edition, 1971).

Lott, Richard W., Basic Systems Analysis (San Francisco: Canfield Press, 1971).

C. Perlick, Walter W., Introduction to Business - Programmed Learning Aid (Homewood, Illinois : Learning Systems Co., 1971).

Management and Organization (Southport, Conn.: Future Resources and Development Inc., 1971). A programmed independent study course.

Churchman, C. West, The Systems Approach (New York: Dell Publishing Co., 1968).

III. The Political Environment of Business

Text:

Corley & Black, The Legal Environment of Business (New York: McGraw Hill, 1968)

Required readings: Howard, Legal Aspects of Marketing (New York: McGraw Hill, 1964)

Marcus, Competition and the Law (Belmont: Wadsworth Publishing Co., Inc., 1967)

Musolf, Promoting the General Welfare: Government and the Economy (Glenview, Ill.: Scott, Foresman, 1966)

Dahl, Modern Political Analysis (Englewood Cliffs New Jersey, Prentice Hall, 1963)

Alternate text: Mund & Wolf, Industrial Organization & Public Policy (New York: Appleton-Century-Crofts, 1971)

(The best available - but perhaps a bit advanced for undergraduates. Use of this would negate the above required readings except for the Dahl. Students who found the Mund & Wolf too difficult could refer to Howard, Marcus, and Musolf.

Background readings:

Low, The Economics of Antitrust: Competition and Monopoly (Englewood Cliffs, New Jersey: Prentice Hall, 1968)

Einhorn & Smith, Economic Aspects of Anti-trust: Readings & Cases (New York: Random House, 1968)

Sichel, Industrial Organization & Public Policy: Selected Readings (Boston: Houghton Mifflin, 1967)

Dahl, Pluralist Democracy in the United States: (Chicago: Rand McNally, 1967)

AREA III

LOGISTICS

Richard H. Evans
Richard J. Hopeman
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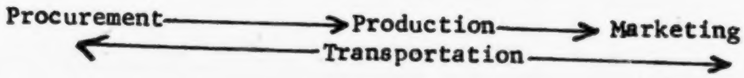
LOGISTICS

The term logistics may be defined as the management of products and services from the point of origination to the point of acceptance and use by the customer. Logistics includes the functions of procurement, production, marketing and transportation. The relationship between the functions is depicted in Figure 1.



Logistics in this course must be viewed in a generic sense. That is it should not be considered to be analogous to transportation or physical distribution from the point of production to the consumer. Rather logistics in this course should be interpreted in a broad sense that involves the creation of time, place and form utility.

In order to comprehend the depth of the subject of logistics the functional concepts mentioned in Figure 1 will now be defined. They are defined as follows:

Procurement - this term refers to the purchasing activities that are performed by an organization.

Production - this concept involves "the creation of things or services which are directly or indirectly capable of satisfying human wants." [1]

Marketing - this function pertains to ... the analyzing, organizing, and planning, and controlling of the firm's customer-impinging resources, policies and activities with a view to satisfying the needs and wants of chosen customer groups at a profit." [2]

Transportation - this concept involves all those activities that pertain to transferring a product or service from one point to another. The transportation activity is concerned with the physical flow of goods or services.

This course will be divided into six main areas:

- Environmental Analysis
- Product Decisions
- Physical Distribution Decisions
- External Communication Decisions
- Procurement Decisions
- Logistics Information Systems

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[1] E. E. Nemmers, Dictionary of Economics and Business (Totowa, N.J.: Littlefield, Adams and Co., 1966), p. 331.

[2] P. Kotler, Marketing Management: Analysis, Planning and Control (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1967), p. 12.

The systems approach will be used to tie and integrate the various subjects and areas in this course together. Other approaches could also be utilized in the study of logistics. As an example, the macro approach that is concerned with logistics in the nation as a whole could be employed. Or, at the opposite end of the continuum, the micro approach that pertains to an individual organization may be used. This course will emphasize the micro approach. The functional, descriptive, quantitative and qualitative approaches may also be used to study logistics. As this course is concerned with the managerial aspects of logistics it may be assumed that all four approaches - functional, descriptive, quantitative and qualitative - will be employed and incorporated in a unifying manner with the systems approach. The aforementioned four approaches, however, will be subservient in use to the managerial systems approach. In this course the management aspects of logistics will be emphasized. In other words, the areas of analyzing, organizing, planning and control will be considered relative to the subject of logistics. This is not a descriptive course nor a functional course, rather it is a course in logistics management.

Numerous reasons exist why such a course is useful to a manager. Two main points will be mentioned. First, the logistics area is usually the most cost incurring or expensive in an organization. Therefore, it seems reasonable that a manager have some understanding as to how to most effectively manage this area. Second, a course in logistics is useful as most organizations whether they be private, public or quasi-public are involved with or related to the activities that are performed within the logistics domain. Due to the importance of the subject of logistics in an organization and due to its applications on a multi-organization basis, the subject of logistics is one that should be understood by a student of management.

At the end of each module is a list of behavioral objectives. These behavioral objectives are examples only and they should not be construed as being inclusive and final.

1. Introduction to Logistics
   Course Outline

   Definitions
   Historical Development
   Functions
   Behavioral Objectives (Examples)
     Define the terms procurement, transportation, marketing, production, and logistics.
     List what may be included in the subjects of procurement, transportation, marketing and production
     Draw a chart showing the stages of development in transportation, production and logistics.
     List the functions that are involved with the subject of logistics

2. Systems Approach
   Course Outline

Definition
Material flow
Inputs
Transformation Process
Outputs
Cooperation with other approaches

Behavioral Objectives (Examples)
  Define the term system
  Draw a hypothetical materials flow through an organization
  List what is in an input
  List waht is in a transformation unit
  List what is in the output section
  Define the other approaches that may be considered in the study of logistics

3. Environmental Analysis I
Course Outline

Economic Factors	Market Factors
Competitive Factors	Business Factors
Union Factors	Political Factors
Legal Factors	Social Factors

Behavioral Objectives (Examples)
  From among six factors choose the two that are most important from an economic standpoint.
  From among five factors choose the two that most affect an organization from a competition standpoint.
  List five affects of a union on an organization.
  List two laws that affect transportation, marketing and production, respectively.
  List two ways that a law may affect transportation, marketing and production, respectively.

4. Environmental Analysis II
Course Outline
  External determinants of market behavior
  Internal determinants of market behavior
  Acceptance process
Behavioral Objectives (Examples)
  Define the concepts that constitute external determinants.
  List ten ways that the external determinants will affect the logistics system.
  Define the internal determinants of market behavior.
  List two ways that the internal determinants will affect the logistics system.
  Draw the acceptance process.

5. Product Policies I - Planning and Control
Course Outline
  Definition of a product
  Product mix analysis
  Product life cycle analysis
  Product characteristics decisions
  Product typology and logistical decisions

Introducing and eliminating products
Behavioral Objectives (Examples)
Define the term product.
List five advantages of a balanced product mix.
Draw the stages of the life cycle of a product.
List two logistic factors that need to be considered at each stage of the product's life cycle in order to insure objective fulfillment.
List five factors that are viewed to be a product characteristic.
Draw one model that depicts the product typology and logistic relationship.
Draw in sequential order the activities that are involved in introducing and eliminating a product.

6. Product Policies II - Pricing Decisions
Course Outline
Definition of price
Pricing objectives
Cost oriented pricing
Demand oriented pricing
Competition oriented pricing
Other pricing approaches
Behavioral Objectives (Examples)
Define the concept price
List four pricing objectives
List the parts of the cost oriented approach to pricing
List the parts of the demand oriented approach to pricing
List the parts of the competition oriented approach to pricing
Define the other approaches to price setting

7. Product Policies III - Inventory Control
Course Outline
Order time
Order amount
Quantitative calculations
Behavioral Objectives (Examples)
List the important factors to consider when considering the optimum order time.
List the important factors to consider when considering the optimum order amount.
Develop one quantitative model for determining the optimum order amount. Show hypothetical calculations.

8. Physical Distribution I - Mode of Transportation Selection
Course Outline
Modal Alternatives: air, rail, motor carriage, inland waters and ocean vessels, pipeline
Characteristics of American Transport: diversity, private ownership, regulation, innovation, competition
Carrier Types: common, contract, private, exempt
Legal Requirements in carrier services: nondiscrimination, delivery, reasonable rates, routes, safety, service quality

Route Alternatives and Combinations
Line Haul Service
Terminal Services
Coordinated multi-carrier or multi-modal services: through rates, common ownership, contractual arrangements
Innovation and Special Services: containerization, trailer-on-flatcar operation, air freight
The Private Carriage Decision
Shipper Requirements and Operating Characterics as Determinants of Mode Selection
Strategies in designing the transport system; the role of computerization

Behavioral Objectives (Examples)
List and define carrier types.
List important factors in the private carriage decision.
Draw one model that relates transport system development to marketing and production policies.
Define the basic requirements of mode and carrier selection.
List and describe four alternatives in coordinated multi-modal transport service.
Describe the legal restrictions placed on carrier service and marketing.

9. Physical Distribution II - Location of Facilities
Course Outline
Objectives in Site Location
Facility Location Factors
Behavioral Objectives (Examples)
List 5 objectives that should be considered when locating a facility.
List 10 factors that should be considered when locating a transportation facility. Also list 10 factors for a retail outlet and 10 factors for a manufacturing plant.

10. Physical Distribution III - Channel Selection
Course Outline
Nature of Channels
Types of Intermediaries
Characteristics of Middlemen
(Producers, wholesalers and retailers)
Channel Design and Selection
Evaluating Channel Alternatives
Behavioral Objectives (Examples)
Draw the different channels of distribution that exist.
List the characteristics (5) of each intermediary.
List 10 factors that need to be considered when selecting a channel.
Product 5 quantitative models (calculations) that would be useful to use when evaluating a channel.

11. Physical Distribution IV - Rate Structure and Theory
Course Outline
Unique characteristics of transport pricing
Characteristics of demand for transport services
Characteristics of carrier cost structures
Characteristics of transport competition

Theory of transport pricing
Practice of transport pricing
Pricing and public policy
Rate innovation
Impact of transport rates on economic activity
Behavioral objectives (Examples)
List the unique characteristics of transport pricing.
Define the derived demand concept.
Describe the ways in which transport rates are regulated.
List the basic types of transport rates and define each.
Describe the way in which freight classifications are developed and used.
Define joint costs, common costs, opportunity costs, and social costs as they apply to transport operations.
Define value-of-service and cost-of-service as bases for transport rates and describe the necessary conditions for their use.
Describe the forces leading to changing methods in transportation pricing.
Define regulatory bases for reasonable rates.
Describe the influence of transport rates on industrial location.
List three recent innovations in pricing practice.

12. Physical Distribution V - Facility Design
Course Outline
Objectives of facility design
Basic types of design
Process design
Fixed-position design
Cost comparisons by type of design
Factors affecting facility design
Quantitative analysis of facility design
Behavioral Objectives (Examples)
List the objectives of facility design
List and define the basic types of facility design
Draw a process design
Produce one quantitative model that may be used in a facility design problem.

13. External Communication
Course Outline
Objectives
Types of advertising, personal selling and promotion
Message design
Channel selection
Behavioral Objectives (Examples)
List 10 operational external communication objectives.
List two advantages of each type of communication (ads, p.s. and p).
List 10 factors that must be considered when designing a communication message.
List the communication channels that exist for an organization.
Match the main advantage of each channel with the channel that is shown.
Match the main disadvantage of each channel with the channel that is shown.

14. Procurement Decisions
   Course Outline
      The objectives of the procurement department
      The purchasing procedure
      Determination of sources of supply
      Determination of prices
      Make, buy or lease decisions
      Value analysis
      Systems contracting
      Operations research in procurement
   Behavioral Objectives (Examples)
      Define the objectives of the procurement department.
      Outline the purchasing procedure.
      List the factors involved in determining the price.
      Outline one OR model that may be employed in procurement.

15. Logistics Information System I - Research Methods
   Course Outline
      Logistic Research - meaning and definition
      Scope of logistic research
      Logistic research process
      Secondary data
      Primary data
      Survey design
      Experimental design
   Behavioral Objectives (Examples)
      Define the term logistics research
      List what is included in logistics research
      Draw the logistics research process
      Define the term secondary data
      Define the term primary data
      List 5 problems with using secondary data and 5 problems with using primary data
      Define a survey design
      Define an experimental design
      Develop a complete survey design
      Develop 3 experimental designs

16. Logistics Information System II - Cost Analysis
   Course Outline
      Product cost analysis
      Physical distribution cost analysis
      External communication cost analysis
   Behavioral Objectives (Examples)
      Calculate product cost using one of the models presented in the text
      Calculate physical distribution cost using one of the models presented in the text
      Draw the affect of different transportation costs on total costs using queuing theory
      Draw a breakeven chart showing the affect of different distribution costs
      Develop 3 different communication budgets

17. Logistics Information System III - Measurement and Forecasting
Course Outline
  Controlling the product mix
  Physical distributions measurement
  Measuring the effectiveness of external communication
  Forecasting demand
  Forecasting transportation usage
Behavioral Objectives (Examples)
  Reproduce a model indicating how an optimum product mix may be obtained
  Draw a model that will assist a manager to determine channel effectiveness
  Draw a model that will show the relationship between different transportation rates.
  Draw a model that may be used to measure one form of communication effectiveness
  Calculate the demand level for a product 10 years from the present
  List the factors that need to be considered when forecasting transportation usage

READING ASSIGNMENTS:

Text: Roy J. Sampson and Martin Farris, Domestic Transportation: Practice, Theory, Policy, Second Edition (Boston: Houghton Mifflin Co., 1971).

Assignment:

Outline Section	Chapters
1	1,2,3
2	25
3	16,17,18,19,20,21, 22,23,24
4	---
5	---
6	---
7	27
8	4,5,6,7,8,9
9	14,15
10	---
11	10,11,12,13
12	28
13	---
14	---
15	26
16	---
17	29

Text: E. J. McCarthy, Basic Marketing, Fourth Edition, (Homewood, Ill.: Richard D. Irwin, Inc., 1971).

Assignment:

Outline Section	Chapters
1	1,2
2	1,28
3	3,6,7,27
4	8,9
5	10,11,12,13,14
6	23,24,25,26
7	---
8	18
9	---
10	15,16,17,19
11	18
12	---
13	20,21,22
14	---
15	4
16	29,30
17	5

Text: Hopeman, R. J., Production: Concepts/Analysis/Control, second edition, (Charles E. Merrill Publishing Co., Columbus, Ohio, 1971).

Assignment:

Outline Section	Chapters
1	---
2	3
3	1
4	---
5	---
6	---
7	14
8	7
9	5
10	---
11	---
12	---
13	---
14	13
15	9
16	---
17	11

AREA IV

QUANTITATIVE ANALYSIS

AREA OF COMPENTENCY

QUANTITATIVE ANALYSIS

Involves statistical theory, computer methods, and model-building for the effective utilization of numerical information in managerial analysis.

Three major segments, with major topics listed below, are included in this area:

Statistical Analysis	Managerial Computer Utilization	Quantitative Managerial Analysis
Data Analysis	Fundamentals of Computer Operation	Linear Regression and Correlation
Probability Theory	Elements of Computer Programming	Decision Framework
Sampling Theory	Problem Formulation	Classical Decision Theory
Estimation	Information Systems	Bayesian Decision Theory

Statistical Analysis focuses on theory and methods necessary for the collection, presentation, and analysis of numerical data. Emphasis is placed on the use of partial information (sampling).

Managerial computer utilization focuses on the fundamentals of computer operation and essentials of computer programming. Specific uses of the computer for system design and problem solutions are also considered.

Quantitative Managerial Analysis focuses directly on the decision process. The decision process is conceptualized and methods for handling various decision situations, and theory for each is developed.

Each segment will now be described followed by a statement of student performance objectives and an outline of topical coverage.

I. Statistical Analysis

Decision-making requires a deep understanding of the situation. Quantification or the process of expressing things in numerical or abstract terms is an important step toward this understanding. Of course, with quantification comes the need to understand the many dimensions of numerical information. Theory to provide this understanding is contained in the Statistical Analysis area.

Statistical analysis of real world phenomena begins with problem definition including a thoughtful analysis of what phenomena one needs to understand, a definition of the population (the set of all the items one wishes to learn about), the nature of the data collection process (questionnaire, personal interview, etc.), the nature of the measurement including the scale, and the error that one can tolerate.

Data analysis is the process of drawing meaning out of the raw data obtained from a statistical investigation, thereby making the results useful input to the decision process. Initially, data can be tabulated, arranged, and classified, then by tabular or graphical presentation methods, the user can easily see the underlying patterns. Data can be summarized, for example, along dimensions of central tendency and variability, to allow quick transmission of information. It certainly must be assessed as to quality, and the nature and likely magnitude of the errors.

Probability theory, a branch of mathematics, is well suited for the analysis of risky situations, which of course is the situation management finds itself in when making decisions. With an understanding of basic probability theory, the manager can assess the various risks of his decision. Probability theory has another important role too as a basis for sampling theory and other advanced statistics and management science topics.

Sampling theory provides a basis for evaluating partial numerical information from a population. Its importance is obvious since decisions are usually made (and for good reason) on partial or sample data. Information can be obtained regarding a population by taking anything from a sample of one observation to that of all the observations (census). However, information is a resource which costs money to obtain. A census is most costly, sometimes impractical and not without errors. Sample information has the types of error inherent in a census, probably to a lesser degree, plus sampling error. The theory of sampling can be employed to assess the magnitude of sampling error if the sampling methods employ random selection. This then allows a consideration of costs and sampling errors from which an optimal number of observations can be determined.

The problem then arises as to how to use sample results. How can the population parameters needed for decision-making be estimated from them? The statistical theory of estimation incorporating the process of statistical inference (making statements about a population from sample information) answers such questions, and allows for an objective determination of the risks and errors of using sample information. At this point, the student has sufficient theory to design and carry out a simple sample survey to meet some informational need objective.

The emphasis in this segment is on understanding of theory and its applicability to management problems rather than on memorization of formulas.

Objectives of Statistical Analysis

The student is expected to be able to do the following in the context of management applications.

1. Discuss statistical problem definition including the determination of the relevant population, characteristic of interest, and parameters.

2. Demonstrate an understanding of data and its collection including the nature of measurement, measurement scales, methods to illicit responses (i.e., questionnaires) etc.

3. Recognize the various sources of error which can be present in a statistical study, and for the more common error sources know how to avoid their occurrence.

4. Differentiate between population and sample data collected for specific reasons.

5. Present a set of data in tabular or graphical frequency distribution form given a specific problem to which the data pertains.

6. Calculate and interpret various summary statistics, including the mean, medean, mode, range, standard deviation, and variance for several administrative purposes.

7. Apply the concept of probability under both classical and subjective interpretations, along with the concommittant notions of random experiment, random variable, basic outcome, sample space, and event.

8. Construct Venn Diagrams which portray the interrelationships of events and assist the learning of probability theory.

9. Apply the formulas for probabilities of conditional, joint, and inclusive events and to interpret results.

10. Determine the number of possible outcomes to a random experiment via probability trees or other counting devices.

11. Apply Bayes Theorem as a means to revise probabilities and assist the decision process.

12. Identify the properties of probability distributions and density functions and to calculate expected values and standard deviations for finite and continuous random variables.

13. Demonstrate an understanding of the theory, formulas, tables for their calculation, and applications of the binomial, hypergeometric, and normal probability distributions.

14. Identify a random selection sampling process and to use a table of random numbers to obtain a simple random sample.

15. Identify the properties of a sampling distribution, to distinguish it from a population distribution, and to demonstrate a knowledge of theory which relates the two types of distributions.

16. Demonstrate an understanding of the Central Limit Theorem to applications of statistics to management problems.

17. Demonstrate an understanding of the process of statistical estimation, including criteria for goodness of an estimator, point and interval estimation and confidence levels by relating each of these concepts to estimating population characteristics in a management situation.

18. Demonstrate a knowledge of theory for estimation of a population mean or a population proportion.

19. Demonstrate a sensitivity to the trade-off between cost and precision in sample survey applications and to contrast design and achieved precision of sample survey.

20. Discuss the stages of investigation of a sample survey, including definition of population and parameter, design of precision and confidence level, calculation of necessary sample size, selection of elementary units, tabulation, and reporting of objectively determined confidence intervals.

Statistical Analysis

Outline

I. Introduction

  A. What is statistics?

    1. Plural tense of word -- numbers, data

    2. Singular tense of word -- a body of knowledge (theory)

    3. A branch of mathematics with applications in many disciplines

  B. Applications of statistical theory for management

  C. Historical development of statistical theory

  D. Inference -- the heart of statistics

    1. Process of generalizing from specific observations

    2. Key concepts defined (population, sample, elementary unit, characteristics, parameters)

    3. Need for inference by management to aid decision process

    4. Nature of the inference statement (estimate, margin of error, risk of error)

  E. An experiment (performed by each student) which exposes the student to the various errors of a statistical study

II. Data analysis

  A. Origin of data

    1. Problem definition -- characteristic(s) of interest

    2. Measuring device, scale of measurement

   3. Complete or partial information
B. Types of data (variable)
   1. Dichotomous
   2. Discrete
   3. Continuous
C. Practical applications for data collection
D. Stages of data refinement
   1. Raw data
   2. Arraying
   3. Grouping
      a. Tabulation by interval
      b. Variable type, error considerations in choice of interval size
E. Frequency distribution
   a. Importance as data transmission vehicle
   b. Construction
   c. Common shapes (symmetric, skewed, bimodal, others)
   d. Cumulative frequency distribution
F. Summary statistics
   a. Measures of central tendency
      1. Mean
      2. Medean
      3. Mode
      4. Relation of mean, medean, mode
      5. Consideration of "appropriate" measure of central tendency for a situation.
   b. Measures of variability
      1. Range

        2. Variance
        3. Standard deviation
        4. Coefficient of variation
        5. Chebycheff's inequality

III. Probability theory

- A. Introduction
    - a. Importance of probability theory as mathematical basis to statistical theory
    - b. Some interesting problems in probability
    - c. Introductory definitions (set, random experiment, random variable, basic outcome, sample space, event)
- B. P(A), the probability of event A
    - a. Classical definition
    - b. Subjective definition
- C. Experimental approach toward estimating probabilities
- D. Venn diagram
- E. Special probabilities
    - a. Conditional probability
    - b. Joint probability
    - c. Inclusive probability
- F. Statistical independence
- G. Counting devices (permutations, combinations, "words")
- H. Discrete probability distribution
    - a. Basic nature
    - b. Expected value and variance of random variable
    - c. Important types
        - 1. Binomial
        - 2. Hypergeometric

I. Continuous probability distribution (density function)

a. Probability as an area

b. Expected value and variance of random variable

c. Normal distribution

1. Importance

2. Nature

3. Standard normal deviate

IV. Sampling theory

A. Concept of a sampling distribution

a. All possible samples

b. Necessity of random selection

c. Sample statistics

d. Sampling error

B. Simple random sampling

C. Generation of sampling distributions of the sample mean, proportion, medean, and range from known small populations using simple random sampling.

D. Theory for the sampling distribution of the sample mean, proportion, standard deviation

E. Central limit theorem

V. Estimation

A. The estimation process

B. Point estimation

a. Unbiasedness

b. Efficiency

c. Consistency

d. Theory for estimating population means proportions, and standard deviations

C. Interval estimation
   - a. Interval formation
   - b. Confidence level

D. Complete cycle of estimation (from initial information need to final confidence interval)
   - a. Definition of population
   - b. Precision goal statement
   - c. Choice of sampling method
   - d. Determination of necessary sample size
   - e. Cost-benefit analysis
   - f. Carry-out of the sampling
   - g. Calculation of point estimation
   - h. Formation of confidence interval
   - i. Analysis of non-sampling errors and their effects on results

E. Some applications of estimation to management

Statistical Analysis

Bibliography: Instructional Materials

A. Text: Neter and Wasserman, *Fundamental Statistics for Business and Economics*, 3rd Edition (Boston: Allyn and Bacon, 1966).

Supplementary material: Whitmore, Neter, and Wasserman, *Self-Correcting Problems In Statistics* (Boston: Allyn and Bacon, 1970).

B. Alternative texts: Boot and Cox, *Statistical Analysis for Managerial Decisions* (New York: McGraw-Hill, 1970).

Freund, *Statistics: A First Course*, (Englewood Cliffs, N.J., Prentice-Hall, 1970).

Hoel and Jessen, *Basic Statistics for Business and Economics* (New York: Wiley, 1971).

Richmond, *Statistical Analysis*, 2nd Edition (New York, Ronald, 1964).

Wonnacott and Wonnacott, *Introductory Statistics* (New York, Wiley, 1969).

C. Alternative supplementary material: Speigel, *Theory and Problems of Statistics: Schaum's Outline Series* (New York, McGraw-Hill, 1961).

II. Managerial Computer Utilization

The computer in the business environment is relatively recent, but its impact has been widely felt. It has literally altered our thinking concerning the problems we are willing to tackle and our method of solving them. But yet, there are those in responsible decision making positions that are either unaware of the computer's ability or are unduely awed by the "big block box."

To enable a manager to effectively increase his abilities as a decision maker by means of the computer, it is necessary to have some understanding of the fundamentals of operation. To solve specific problems on the computer or, for that matter, to be able to know when it is economically feasible to utilize a computer, it is not necessary to know all the details of computer programming. What is necessary is a firm understanding of problem formulation, i.e. flowcharting. Actually expressing a problem in flowchart form is not easily accomplished since it is a somewhat illustrated process.

To enable one to properly put a problem into programmable form, it is necessary to comprehend the essentials of programming. The programming that one would need is not necessarily any one particular language, but FORTRAN, an algebraic language, suffices quite well. What is essential besides knowing the simple arithmetic operations, i.e., addition, subtraction, division, and multiplication, is the comprehension of the complexities of program branching and looping. The ability to alter the order of the executable program statement by performing a test on a variable that may have just been previously altered is the key distinction between a desk calculator and a computer.

Besides comprehending the essentials of problem formulation, it is also important to understand the usefulness of the computer in establishing an information system of some form. The understanding of the use and feasibility of computer record keeping and large scale file management systems as well as time-sharing mechanisms is necessary from a managerial viewpoint. The economics of data collection, synthesis, and dissemination are becoming increasingly important.

In addition to comprehending general problem formulation procedures it is also vital to understand problem classes that are particularly well suited to solution by computers. Simulation, as one of the primary techniques brought about by computer technology, is now one of the more heavily relied upon techniques available to decision makers. Heuristic programming and aritificial intelligence which are examples of the more progressively complex techniques should be part of the manager's working knowledge, and especially more so in the future.

Objectives of Management Computer Utilization

The student should be able to:

1. Understand the basic operations of a computer system and the execution of a program instruction.

2. Formulate problems in terms of a flowchart.

3. Write programs in FORTRAN involving all of the arithmetic operations including the input and output.

4. Write programs that involve branching and looping by testing variables.

5. Design a relatively simple computer based information system.

6. Recognize the pertinent economic factors in the establishment of a data bank and information system.

7. Understand the elementary principles of the more advanced programming techniques of simulation, artificial intelligence, and heuristic programming.

Specific Course Outline

I. Introduction - the computer as a managerial tool
  A. Solving specific problems or problem classes with the aid of the computer
    1. Statistical data summation and problem solutions
      a. Examples of realistically sized analysis of variance problems
      b. Examples of multi-variable regression problems
    2. The computers worth to operations research
      a. Uses of linear programming
      b. Simulation as a means for evaluating alternatives
  B. The use of the computer for information storage and retrieval
    1. The establishment and use of a data bank
      a. Marketing's use of information for product and customer decisions
      b. Finance's use of a data bank for capital budgeting
    2. The development of the firms as a total system
II. The computer - its physical configuration and function
  A. The central processor unit CPU and its function
  B. Input devices
    1. Card reader
      a. The punched card
      b. The conversion of punched holes into electrical impulses

    2. Punched paper tape as an input device
    3. Magnetic tape as a means of input
    4. The magnetic disk
    5. The teletype and operators console
C. Output devices
    1. Line printer
    2. Card punch
    3. Tape deck
    4. Other output devices, i.e., teletype, plotter, cathode ray tube, etc.
D. Core memory
    1. The concept of storing electrical impulses in cores in the main storage unit.
    2. The concept of storing both the instructions and the data in the core memory.
E. The concept of time sharing both internal and external

III. The basic elements of computer programming
A. The fundamental concept of the fetch/execute cycle
    1. The first step is to read the instruction and interpret it.
    2. Within the instruction is not only what to do but where within the core memory to find the location of the information.
    3. It then goes to the specified location, finds the information (fetch), and then executes the instruction.

4. The result is placed in the accumulator
5. The last part of the instruction is to get the next instruction

B. The basic instructions that can be performed are quite similar to those performed on a desk calculator, i.e., addition, subtraction, multiplication, division and clearing and adding.

C. The control instructions are the principle instructions that increase the flexibility and the use of the program.

1. These are instructions that can alter the sequence of instructions depending upon some condition that occurs from the result of an executed instruction.
2. These instructions allow one to perform a wide variety of operations, the specific operation depending upon the results that have been obtained.

D. A sequence of operations designed to accomplish specific task is defined as a program.

E. Compilers allow one to write programs in a language more suitable to humans, rather than writing programs in a machine language.

1. Machine instructions are quite detailed and would require considerable effort on the part of humans.
2. The compiler is merely a program that converts English instructions into a sequence of machine instructions thereby reducing the work load considerably, i.e., weeks vs. hours.

3. Different compilers have different inputs (i.e., languages) in order to make certain classes of problems easier to program.

IV. Flowcharting - the process of formulating a specific problem into a logical sequence.

- A. Flowcharting as a series of building blocks
- B. The use of tests for branching
- C. The use of loops for constructing algorithms
- D. The concept of sub-programs

V. FORTRAN as a computer language

- A. Arithmetic statements and assignments
    - 1. Constants vs. variables
    - 2. Arithmetic operations and order of computation
    - 3. Function, labels, and assignment statements
- B. Conditional and iteration control statements
    - 1. Logical and arithmetic IF statements
    - 2. DO statements iterations, and vested iterations
        - A. Subscripted variables
- C. Input and output control statements
    - 1. Read and write statements
    - 2. Format control
- D. Size specifications, i.e. DIMENSION statements
- E. Use of functions and subroutines, both internal and external
- F. Specification of necessary job control statements
- G. More of the more common programming errors and their detection

1. Compiler detected errors

a. Syntax errors and their compiler messages

b. Common invalid expressions

2. Logic errors and their detection

a. Trace routines

b. Debug packages

VI. Basic concepts of information systems

A. The need for such a system

B. Information service as an emerging field

C. Unit record data processing

D. Information storage devices

E. Data file management

F. Real-time systems

G. Time share systems

H. Economics of data collection and dissemination

VII. Problem classes particularly well suited to computers

A. Simulation as a means for comparing alternatives

1. Building the model

2. Generation of random numbers

3. Simulation of data

4. Comparison of results

B. Introduction to more complex programming

1. Artificial intelligence

2. Simulation of human thought

3. Heuristic programming

Managerial Computer Utilization

Instructional Material

Gonzalez, Richard F. and McMillan, Cloude, *Machine Computation: An Algorithmic Approach*, Richard D. Irwin, Inc., Homewood, Illinois, 1971.

Organick, E.I., *A FORTRAN IV Primer*, Addison-Wesley, Reading, Massachusetts, 1966.

III. Quantitative Managerial Analysis

The solution of management problems depends heavily on the availability of timely and precise information: a point developed extensively in the Statistical Analysis segment. In that material, sample-based information with accompanying statements of precision was introduced as a means of meeting management's reporting needs. In the Quantitative Managerial Analysis segment this problem will be extended to the estimation of relationships among two variables as in a forecasting situation in which management might wish to study the relationship of sales of a particular product to the passage of time to gain insight into the pattern of expected growth. In addition, the use of probability and statistics will be explored in assisting the making of management decisions: for example, choosing among alternative means of providing for insurance on facilities. Several prototype decision models will be explored in terms of the nature of uncertainty and relevant criteria which management might choose to adopt. Recognizing that in many cases a decision may require collection of additional information, management is often faced with the question, "How much information is enough?"; a subject dealt with in detail in this segment.

The emphasis will continue as in the previous segment to be on developing skills in the use of elementary statistical and quantitative models as distinguished from the ability to develop such models. The selection of topics includes those which have found repeated application in the past and show promise for future application in management analysis. In each case the goal is to develop an understanding of how a particular problem situation may be structured so that a meaningful decision rule can be formulated and applied and how decisions based on sample information are to be interpreted.

Objectives

The primary objective of this segment of the Area is to continue the discussion of elementary statistical and quantitative methods of analyzing management problems. Topics include simple linear regression and correlation, quantitative aspects of decision making, statistical decision making under uncertainty and under risk. The student will be expected to be able to:

1. Apply methods of simple linear regression and correlation to sample data in a management situation such as forecasting or estimating relationships between two variables and to compute interval estimates where appropriate.

2. Demonstrate an understanding of the "least squares" criterion, the "normal equations" of regression, and the coefficients of correlation and determination.

3. Explain the assumptions underlying both the simple linear regression and correlation models, the difference between the two, and provide proper interpretations of results of regression and correlation analysis.

4. Identify key aspects of a decision problem and apply appropriate decision theory in elementary managerial decision making situations under various conditions of uncertainty and where appropriate, set up a payoff table showing alternatives, outcome states, and consequences.

5. Contrast various decision criteria discussed in required material in terms of attitude toward uncertainty and conditions under which the criteria are appropriate; for example, contrast minimax less minimax opportunity less criteria in terms of the conditions under which management would wish to use these criteria and the "management philosophy" each represents.

6. Construct and evaluate statistical decision rules for two-action problems where prior probabilities are not available for both cases in which an explicit payoff function is known and in which such a function is not known. In this area one should be able to distinguish such notions as act and error probabilities; power and error curves; types of error; admissible and inadmissible decision rules; managerial and statistical conclusions; decision making for means and for proportions; and one-sided and two-sided alternatives.

7. Contrast statistical decision making under uncertainty and decision making under risk; statistical estimation and statistical decision making.

8. Discuss the implications of varying such controllable aspects of decision rules as sample size, acceptable error levels, action limits on the protection afforded by the decision rule.

9. Determine the optimal decision rule and its value in statistical decision making given prior probabilities, a payoff function, and a willingness to use expected values to measure uncertain payoffs.

10. Explain and employ the notion of the value of information as a management concept.

III. Outline

- A. Introduction to quantitative decision analysis
    - 1. Structural elements of a decision problem
        - a. Alternative acts
        - b. Possible outcome states
        - c. Consequences accruing to combinations of acts and states
        - d. Managerial decision criteria for evaluating consequences
    - 2. Various conditions under which decisions must be made and their effect on the choice of criteria
        - a. Certainty
        - b. Uncertainty
        - c. Competition
        - d. Risk
        - e. Mixtures
    - 3. Concept of information value
        - a. Computing the value of information
        - b. Interpreting the value of information
- B. Statistical decision making under uncertainty (without prior probabilities for outcome states)
    - 1. Decision rules for two-action problems involving means and proportions
        - a. With explicit payoff functions -- conditional expected payoff functions and criteria for evaluation

b. Without payoff functions -- controlling the risks of error.
  i. power functions
  ii. error curves
  iii. operating characteristic functions

2. Statistical hypothesis testing as compared with statistical decision rules for two-action management problems
  a. Statistical hypotheses
  b. Nature of the test statistic and acceptance or rejection of the hypotheses
  c. Managerial versus statistical conclusions

C. Statistical decision making under risk (with prior probabilities)
  1. Expectation as a basis for a decision criterion
  2. Bayes decision criterion -- maximizing the expected value of a decision
  3. Selecting the appropriate sample size to satisfy the Bayes criterion
  4. Deciding on the appropriate terminal decision given a specific sample result

D. Simple linear regression and correlation (large sample case)
  1. Basic concepts underlying a linear relationship between two variables

- a. Conditional distributions
- b. Regression line
- c. Management uses of regression analysis

2. Regression curve fitting
   - a. Criteria-choice of least squares
   - b. Mathematical form of regression
3. Estimation of parameters of regression curve
   - a. Point and interval estimates and their uses
     - i. Prediction of specific 'next' events
     - ii. Estimation of conditional means
   - b. Analysis of residuals
4. Correlation analysis
   - a. Measuring the strength of the relationship between two random variables - coefficients of correlation and determination
   - b. Management interpretation of correlation analysis

Quantitative Managerial Analysis

Bibliography: Instructional Materials

See Instructional Materials for Statistical Analysis segment

AREA V

ACCOUNTING

MODULE ______ (Field of Specialization)

ACCOUNTING

Introduction

The professional accountant in today's society has a major responsiblity as an information provider. Information from accounting systems is supplied to investors, creditors, labor unions, government agencies, management and other parties making decisions in our society. The aspirations of those using the accounting system are high. The users demand accurate and relevant information in order to meet the information needs of their decisions.

This module prepares the student to assume his role as a professional accountant. The module covers the theoretical and practical problems in the area of financial and managerial accounting. This module does not cover the areas of auditing or taxation.

This module contains two units. Unit #1 (Financial Accounting Theory) addresses itself to the financial accounting measurement and communication system. It deals with the theoretical framework of this system and takes special note of the reporting needs and demands on the system by various user groups. In specific, the objective of this unit is to present an in-depth study of accounting theoretical knowledge that is fundamental to the practice of financial accounting as a profession. The student is required to analyze and evaluate financial accounting concepts, standards, principles, assumptions as they affect the measurement and communication of business transactions. Emphasis is given to controversial subjects as they represent a challenge to the accounting profession. The announcements of the Accounting Principles Board and other accounting associations are discussed as they relate to the topics discussed.

Operational Objectives of Unit I:

1. Prepare simple and consolidated financial statements from extremely complex data.
2. Prepare special accounting reports--fund statement and statement of affairs.
3. Demonstrate properly the treatment and implications of different measurement concepts and methods related to complex events on measuring business income.
4. Demonstrate an understanding of the ideas and problems surrounding various controversial issues in financial accounting by presenting the argument on either side.

Unit #2 (Cost Analysis and Control) deals with the managerial cost accounting systems. These systems are designed to provide cost information relevant to internal decision-makers in both profit and non-profit organizations. The student is educated in this unit to become equipped with the advanced tools necessary to become a cost analyst. Many decisions are made without proper evaluations of cost consequences of alternative decisions. However, more emphasis is given to the importance of such analysis in non-profit organizations. The demand for such services opened a new dimension of the kind of activities a professional accountant can perform. Management services began to constitute a large portion of CPA firms duties. The student, accordingly, is required to articulate cost accounting concepts and standards as they provide a guidance to cost accounting measurement and reporting systems.

Operational Objectives of Unit II:

1. Prepare, evaluate and analyze managerial cost information relevant for planning decisions.
2. Prepare, evaluate and analyze managerial cost information for controlling business operations.

3. Prepare and evaluate cost data relevant for determining the cost of a product/service rendered.
4. Discuss intelligently cost accounting concepts, standards, techniques and methods.

UNIT I--FINANCIAL ACCOUNTING THEORY

Outline

I. Theory Development in Accounting--A Historical Perspective

   A. Federal Reserve Board (1920's)

   B. American Institute of Accountants--Committee on Practice

   C. Accounting Principles Board (APB)

   D. Internal Revenue Services Rulings

   E. The current role of the S.E.C. and the APB of the AICPA in establishing accounting practice and theory

      (1) Accounting series releases

      (2) APB's statements and opinions

II. Valuation and Measurement Problems in Accounting

   A. Theories of measurement and accounting valuation

   B. Measurement problems of economic data vs. financial data

   C. Cost, input/output values

   D. Objectivity, verifiability, relevance, freedom from bias as measurement standards

   E. Financial accounting theory of measurement

III. Measurement of Income

   A. Objectives of income reporting: capital vs. income

   B. Several concepts of income:

      (1) Economic

      (2) Operational

      (3) Transaction approach

IV. Revenues and Expenses; Gains and Losses

   A. Revenue: the nature of revenue and what is to be included

B. Measurement of revenue:

(1) Point of sale

(2) Installment sales

(3) Contract completion

C. Expense defined

D. Expense measurement--the timing problem

V. Impact of Changing Price Levels on Income Measurement

A. Nature of price changes: general, specific and relative price changes

B. Monetary and non-monetary gains and losses

C. Objective of adjustment for price level changes

D. Price level index: various indices

E. Strengths and weakness of indices for the objectives

VI. Assets and their Measurements

A. Nature of assets (vs. expenses and losses)

B. Valuation methods for creditors,management and investors

C. Valuation concepts: cost, exchange output values, lower of cost or market, etc.

VII. Current Assets (I):

A. Objectives of asset classification

B. Working capital concepts and definition of currrent assets

C. Cash and marketable securities--measurement problems

D. Other current assets--specification requirements and measurement problems

VIII. Current Assets (II):

A. Measurement techniques for inventory evaluation:

(1) FIFO

(2) LIFO

(3) Average

(4) Retail

(5) Others

B. Reporting problems: lower of cost or market, obsolete inventory, appreciation

IX. Fixed Assets

A. Non-current asset defined

B. Present concept of valuation: cost defined

C. New concepts of valuation: advantages and shortcoming

D. Self constructed asset

E. Repairs, replacements and additions

X. Depreciation

A. Definitions of depreciation

B. Maintenance of capital question

C. Methods of depreciation

(1) Straight line

(2) Accelerated

(3) Composite

(4) Others

XI. Income Taxes, Lease Committments, Pension Costs and Research and Development

A. Tax allocation and Internal Revenue Services regulations

B. Leased assets: asset or expense? Measurement and allocation problems

C. Pension costs--measurement and allocation problems

D. Research and development costs--measurement and allocation problems

XII. Liabilities

A. Nature of liabilities

B. Classification and measurement problems:

(1) Current

(2) Long-term: bonds and notes

C. Contingent liabilities--nature and measurement

XIII. Ownership Equities: Corporation

- A. Nature of ownership: various theories, proprietory, entity, residual, fund
- B. Classicification: capital sources, legal capital, paid in capital
- C. Retained earnings classifications, restrictions, dividends
- D. Earnings per share

XIV. Ownership Equities: Proprietorship, Partnership and Joint Ventures

- A. Proprietory capital and income
- B. Partnership capital and admission of partners
- C. Partnership liquidation
- D. Joint venture accounting

XV. Financial Reporting

- A. Disclosure and audited reports
- B. Consolidated financial statements
  - (1) Conditions of consolidation
  - (2) Limits of the statements
  - (3) Simple consolidated statements
- C. Pooling and purchase

XVI. Consolidated Statements

- A. Minority equity
- B. Intercompany expenses and revenues
- C. Method of statement preparation

XVII. Special Fiduciary Statements

- A. Statement of affairs
- B. Realization and liquidation reports
- C. Estate accounting

Recommended Books:

(1) Eldon Hendriksen, Accounting Theory, R.D. Irwin 1970

(2) Meigs, Johnson, Keller, Mosich, Intermediate Accounting, McGraw Hill, 1968

(3) Meigs, Johnson, et al., Advanced Accounting, McGraw-Hill, 1970

(4) Opinions and Statements, Accounting Principles Board of the AICPA

(5) A Statement of Basic Accounting Theory, American Accounting Association, 1966

UNIT II--COST ANALYSIS AND CONTROL

Outline

I. Introduction

- A. Cost accounting objectives
- B. Differences between cost accounting and financial accounting
- C. Cost accounting concepts: variable costs/fixed costs, historical/future cost, direct/indirect etc.
- D. Cost accounting standards
- E. Management process and managerial cost accounting

II. Budgetary Process and Organizational Planning

- A. Budget definition
- B. Budget is a reflection of corporate goals:
    - (1) Goals of organization
    - (2) Individual goals
    - (3) Interaction of individual and organizational goals
- C. Long-range planning and its relation to operating budget
- D. Planning program budgeting
- E. Budget development: process, review, trade-off to attain goals
- F. Levels of standards and relationship between budget and standards
- G. The effects of pressure, participation, conflict in budget development

III. Developing Sales Budget

- A. The grass-roots approach to sales forecasting
- B. The statistical approach to sales forecasting
    - (1) Multiple regression
    - (2) Weighted moving average
    - (3) Probabilistic sales budget
- C. Behavioral concepts affecting the formation of sales budget

IV. Developing Cost Budget

- A. Cost estimation
    - (1) Accounting methods
    - (2) Engineering methods
    - (3) Statistical methods:
        - (a) Cost estimation based on regression analysis
        - (b) Proabilistic cost estimation
- B. Establishing standard costs: type of standards, setting standards for material, labor and overhead
- C. Flexible budgeting and cost estimation
- D. Learning curve and cost estimation
- E. PERT--cost/time/resource analysis estimation

V. Linear Programming Approach to Budget Development

- A. The advantages of developing business budgets based on linear programming
- B. Data required to develop a linear programming budget model
- C. Basic concepts of linear programming
- D. Solution of the linear model
    - (1) The direct method
    - (2) The dual method
    - (3) The simplex method
- E. Integer programming and budget formation

VI. Break-Even Analysis Under Risk

- A. Evaluation of the assumptions underlying break-even analysis under the deterministic model
- B. Break-even analysis for multiple products: fixed proportion, variable proportions
- C. Break-even analysis for non-linear cost and revenue
- D. Break-even analysis under conditions of uncertainty
- E. Goal programming approach to break-even analysis

VII. Nature of Control Systems

- A. Meaning of control--various concepts of control
- B. Characteristics of a control system
- C. Information and control systems:
    - (1) "Feedback" as a concept
    - (2) "Frequency of reporting"
    - (3) Measurement of "information needs"
- D. Motivational and behavioral dimensions of control

VIII. Responsibility Accounting as an Information Control System

- A. Responsibility accounting defined and illustrated
- B. Controllable and uncontrollable costs
    - (1) Problems of allocation
    - (2) Actual or standard controllable costs
- C. Selecting control, or responsiblity, centers
- D. Evaluating responsibility accounting systems in terms of control requirement
- E. The limitations of responsibility accounting systems as an information system

IX. Cost Standards and Variance Analysis

- A. The need for variance analysis for decision-making
- B. "Price" and "quantity" variances for material and labor costs
- C. Mix and yield variances for labor and material
- D. Overhead variances:
    - (1) Two variance system
    - (2) Three variance system
    - (3) Four variance system
- E. Limitation of the traditional variance analysis

X. New Dimension in Control Systems

A. Significant deviation and concept of normal variation in standards

B. Control chart applications to determine the significant deviations

C. Extending the deviation analysis approach:

(1) Bayesian analysis and process control

(2) Deviations as measures of effectiveness vs. efficiency (expost vs. exante analysis)

(3) Studies of report frequency: key variable approach

XI. Evaluating the Performance of a Divisional Manager

A. Surrogate measures: ROI, controllable profit, etc.

B. Transfer pricing: accounting methods, economic methods

C. Implicatings of transfer pricing methods on goal congruence and suggested solutions

XII. Concepts of Product Costing

A. Different concepts of costing a product

B. Absorption costing and direct costing--product costing under each method

C. Advantages and limitations of direct costing

D. Uses of matrix approach for allocating service cost departments to production departments

XIII. Process Costing: Multi-Process Manufacturing Process

A. Characteristics of the process manufacturing system: costing centers, physical flow, and cost flow

B. Cost of production: unit cost calculation (using absorption and direct costing)

(1) Case I : No Beginning or ending goods-in-process

(2) Case II: Beginning and ending goods-in-process exist--calculation of equivalent units

C. Average costing for product cost

D. FIFO costing for product cost

E. Accounting records in a process cost system

XIV. Unit Costing: Spoilage and Joint Products

A. Unit cost calculations in case of spoilage

(1) Cost treatment of normal and abnormal spoilage

(2) Costing for scrap

(3) Costing for defective units

B. Unit cost calculations in case of joint products:

(1) Distinction between joint and by-products

(2) Allocation techniques:

(a) Weighted average methods

(b) Unweighted method

(3) Limitation of the allocations techniques for decision-making

C. The economic views vs. the accountant's views on cost allocation to joint and by-products

XV. Inventory Control Models

A. The usefulness of the model

B. The criteria for choosing an inventory control system

C. Inventory control systems: deterministic case

(1) Lot size system

(2) Order level system

(3) Order level--lot size system

D. Inventory systems under uncertainty

Recommended Books:

(1) Nicholas Dopuch & Jacob G. Birnberg, Cost Accounting, Harcourt, Brace & World, Inc., 1969

(2) Charles Horngren, Cost Accounting, Prentice-Hall

(3) Gordon Shillinglaw, Cost Accounting, Richard D. Irwin

(4) There are several other cost accounting texts available on the market. However, such texts exclude many of the important topics outlined in this course. Accordingly, their usefulness for this course is very limited and we see no reason to mention them here.

AREA VI

FINANCE

EXTERNAL DEGREE PROGRAM

MODULE #   : CONCENTRATION IN FINANCE

The goal of the concentration in finance is to enable the student to understand and to comprehend the full range of the finance function in an individual firm, in an industry, and in the economy, both national and international. Comprehension embraces the ability to discuss critically and analytically the relevant theories, concepts, methodologies, and institutional arrangements in the area of finance.

In more specific terms, the student must understand the process by which (1) resources within the firm are allocated to investment projects under both certainty and uncertainty (2) decisions are reached in either acquiring capital externally or utilizing internally generated funds (3) long range growth is fostered (4) the financial community evaluates both the past performance and future potential of firms and industries.

To achieve these objectives, the student must be familiar with the evolution of the institutions of finance, the regulatory framework within which current institutions operate, and the probable patterns of development in the future. Vital to an understanding of finance in the economy is the area of monetary and fiscal theory and policy. It is essential that the student be able to perceive and analyze the impact of national and international policy decisions in the area upon the financial markets and the decision process within individual business organizations.

EXTERNAL DEGREE PROGRAM

FINANCE MAJOR

I. Resource Allocation Management

  A. Investment Decisions Under Certainty

    1. Analytical concepts

      a. Compounding and discounting: discrete and continuous
      b. Incremental cash flow
      c. Intangible benefits and costs

    2. Profitability criteria

      a. Net present value
      b. Internal rate of return
      c. Profitability index
      d. Equivalence of the methods for accept-reject decisions

    3. Internal rate of return and nonsimple investments

      a. Classification of projects
      b. Method for computing "return on invested capital."
      c. Analysis of nonsimple pure investments
      d. Analysis of nonsimple mixed investments

    4. The reinvestment rate

      a. Implicit assumptions of internal rate of return and net present value
      b. Explicit assumptions
      c. Fisher's intersection
      d. Resolving conflicting decisions

  B. Investment Decisions Under Uncertainty

    1. Crude procedures widely used
    2. Refined procedures
    3. Probabilistic analysis of a single

      a. The expected value: net present value
      b. The variance of net present value
      c. Decision criteria

    4. Adopting portfolio selection to capital budgeting
    5. Decision trees and sequential investment decisions

C. Analysis of Selected Investment Decisions

1. Leasing vs. borrowing
2. Optimal service life
3. The economics of bond refunding
4. Make or buy decisions

II. Capital Costs, Valuation, Dividend Policy, Expansion and Contraction

A. Cost of Capital and Capital Structure

1. The concept defined

a. Hurdle rate
b. Capitalization rate

2. Costs of specific financial obligations

a. Debt
b. Preferred stock
c. Common equity

1) Static company
2) Growth company
3) Retained earnings

3. Trading on the Equity

a. Effect on the amount of residual earnings
b. Effect on Variability of residual earnings

4. Capital Structure and Valuation

a. Traditional hypothesis
b. The Modigliani-Miller hypothesis

B. Valuation

1. Broad applications of the concepts
2. The generalized problem

a. Measuring the returns
b. Evaluating the risk
c. Establishing the capitalization rate

3. Specific problems in valuation

a. Debt instruments of varying risk
b. Common stocks

1) Seasoned issues
2) Issues of small, new firms

4. Methods of equity valuation

    a. Capitalization of earnings
    b. Capitalization of dividends
    c. Capitalization of cash flow
    d. Present value of future price and dividends
    e. Mathematical equivalence of alternative valuation theories

C. Dividend Policy

1. Dividend policy as a financing decision
2. Arguments for the relevance of dividends
3. Arguments for
4. Optimal dividend policy

    a. Stability of dividends
    b. Other behavioral considerations
    c. Stock dividends
    d. Repurchase of stock
    e. Procedural and legal aspects

D. Expansion and Contraction

1. Mergers and acquisitions

    a. Reasons for combinations: financial and behavioral
    b. Types of mergers and consolidations
    c. Acquisitions: techniques and terms

2. Failure and Reorganization

    a. Voluntary arrangements
    b. Involuntary arrangements
    c. Reorganizations : creditor versus stockholder positions
    d. Liquidation: priority of claims

III. Portfolio Investment Analysis and Policy

A. Risk and the Portfolio Investment Process

1. Investment and risk
2. The meaning of investment
3. Investment vs. speculation
4. Investment risks

    a. Market risk
    b. Business risk
    c. Interest rate risk
    d. Purchasing power risk

B. The Securities Markets

  1. Concept of a securities market
  2. Stock exchange functions

     a. Continuous market
     b. Fair price and collateral value
     c. Financing industry

  3. The New York Stock Exchange

     a. History
     b. Organization and membership
     c. Listings
     d. Tradings

  4. Other exchanges
  5. The over-the-counter market

     a. Distinction from organized exchanges
     b. Advantages and disadvanatages

  6. The securities broker

     a. The functions of a broker
     b. Types of brokers orders
     c. Costs of securities transactions
     d. Problem areas in the investor-broker relationships

C. Securities Regulation

  1. The securities acts

     a. The Securities Act of 1933
     b. The Securities Act of 1934
     c. The Maloney Act
     d. Other relevant legislation

  2. The principle of self-regulation
  3. The role of governing and administrative agencies

     a. Securities and Exchange Commission
     b. National Association of Securities Dealers
     c. New York Stock Exchange and other exchanges
     d. States
     e. Other

D. Alternative Investment Outlets for Funds

  1. Government securities

     a. U.S. Governments
     b. State and municipal bonds

        1) Types of bonds
        2) Quality of the borrowers
        3) Bond ratings
        4) Portfolio aspects
        5) Tax advantages

2. Corporate bonds

    a. The nature of corporate bonds
    b. Investment quality
    c. Bond ratings
    d. Investment advantages and disadvantages
    e. Convertible bonds

3. Preferred stock

    a. General nature of preferred stock
    b. Preferred stock yields

        1) Compared with bonds
        2) Historical pattern

    c. Analysis of preferred stock issues
    d. Tax advantages to investors
    e. Convertible preferred stock
    f. Averages and special situations

4. Common stocks

    a. Attributes toward common stock ownership
    b. Attributes and advantages

        1) Voting powers
        2) Dividends
        3) Preemptive rights

    c. Yields - historical experience
    d. Performance measurement
    e. Disadvantages of ownership

5. Mutual funds

    a. Definition
    b. Types of funds according to objectives
    c. Load vs. no-load funds
    d. Measuring the historical performance

6. Other portfolio assets

    a. Real property
    b. Mortgages
    c. Commodity futures
    d. Other

E. Analysis of Financial Statements

  1. Analysis of the income statement

    a. Adjustment of reported income

      1) Effect of reserves
      2) Extraordinary charges
      3) Inventory valuation
      4) Depreciation method
      5) Subsidiaries and affiliates
      6) Dillution

    b. Trend analysis
    c. Forecasting future sales and income

  2. Balance sheet analysis

    a. Liquidity measures
    b. Financial structure
    c. Asset corporation

  3. Rate of return and turnover measures
  4. Per share analysis
  5. Per dollar of market analysis
  6. Asset value and cash value factors

F. Investment Timing

  1. Business cycle analysis
  2. Technical analysis

    a. Dow theory
    b. Point and figure
    c. Line and bar charting

  3. Formula plans

    a. Dollar averaging
    b. Ratio formulas

  4. The random walk theory

G. Institutional Portfolio Management

  1. Commercial and savings banks
  2. Mutual savings bank and savings and loans
  3. Life insurance companies
  4. Property and casualty
  5. Noninsured pension plans

V. Monetary and Fiscal Analysis

- A. Money and Prices: The Quantity Theories
  1. Meanings and the value of money
  2. Measures or price level change
  3. Relation of commodity content to the value of money
  4. The quantity-velocity approach
     - a. The equation of echange: transactions-velocity formulation
     - b. The equation of exchange: income-velocity formaulation
     - c. The quantity theory in transactions-velocity terms
  5. The cash-balances approach
     - a. The cash-balances identity
     - b. The quantity theory in cash-balances terms
     - c. Relationship between the velocity and cash-balances approaches
     - d. The Cambridge approach and the transition to later monetary analysis.
- B. The National Income
  1. The circular flow in a simple economy
  2. National income flows
     - a. Income and transfer payments
     - b. National product as the sum of values added
     - c. Saving and investment
     - d. Gross and net investment
     - e. Saving and investment in the circular flow
  3. National income concepts in a complex economy
     - a. Gross national product
     - b. Net national product
     - c. National income at factor cost
     - d. Personal income
     - e. Disposable income
- C. The Determination of Income
  1. The consumption function
     - a. The marginal propensities to consume and save
     - b. The average propensities to consume and save
  2. The determination of equilibrium income
     - a. The investment multiplier
     - b. The adjustment process

3. The determination of the rate of investment
    a. The "efficiency" of an asset
    b. The marginal efficiency of capital
    c. The investment demand schedule

4. Interrelations between investment and consumption
    a. The accelerator
    b. Interaction of accelerator and multiplier

5. Governmental fiscal effects
    a. The effects of government expenditures
    b. The effects of taxes
    c. Balanced budget effects
    d. The effects of government transfers
    e. Variable taxes as built-in stabilizers

D. Money, Interest and Income

1. The demand for money
    a. The transactions motive
    b. The precautionary motive
    c. The speculative motive

2. Determination of the market rate of interest
3. The integration of money, interest, and income
4. The structure of interest rates
5. The flow of funds accounts
6. The loanable funds approach to interest rate determination
    a. The supply of loanable funds
        1) Deposit-type intermediaries - bank and nonbank
        2) Insurance companies
        3) Pension funds
        4) Investment-type intermediaries
            a) Mutual funds
            b) Bank-administered personal trusts
            c) Bank common trust funds

        5) Consumer-oriented intermediaries
            a) The commercial bank role
            b) Sales finance companies
            c) Consumer finance companies

        6) Government lending agencies

b. The demand for loanable funds

    1) Business investment demand
    2) Mortgage credit
    3) Consumer credit
    4) Agricultural credit
    5) State and local government credit
    6) Federal government demand
    7) Foreign investment

E. Inflation

1. The meaning of inflation
2. Inflation in the total expenditure framework

    a. Pure inflation
    b. Limits to inflation: the price level and the real demand for output
    c. Inflation without limit: "hyper-inflation."

3. Price levels as determined by aggregate demand and supply
4. The mechanisms of inflation

    a. Excess-demand inflation
    b. Supply induced inflation
    c. Structural inflation

5. The effects of inflation

    a. Contractual relationships
    b. Business activity

6. Policy implications

VI. Financial Policies in Operation

A. Stabilization Policy

1. Objectives of stabilization policy
2. The means of stabilization policy
3. The operation of monetary policy
4. Fiscal policy

    a. Types of fiscal policies
    b. The allocative effects of alternative fiscal policies
    c. The case for federal fiscal policy

B. The National Debt and Debt Management

1. Quantitative aspects of federal debt

    a. The federal debt in relation to total debt
    b. The debt in current and constant dollars
    c. The national debt and national income
    d. Interest on the debt and the level of income
    e. Ownership and maturity distribution

2. Ways of viewing the national debt
3. The burden of national debt

    a. The burden of an existing debt
    b. Transferring the burden to future generations
    c. National debt and economic growth

4. Debt management

    a. The nature of debt management
    b. The objectives of debt management
    c. Debt management as an instrument for influencing aggregate demand
    d. The debt as an automatic stabilizer

C. The Accord of 1951

D. Recent Monetary and Fiscal Issues

E. Government and the Banks: Problems of Supervision and Control

1. The nature of relations between government and banking

    a. Nature of interests which are involved
    b. The effectiveness of control

2. The Bases of Examination Policy

    a. "The inherent instability of bank credit"
    b. Credit instability and examination procedure
    c. The valuation of banking assets

3. Role of the government in financial stability

    a. The Federal Deposit Insurance Corporation
    b. The Federal Reserve and the Treasury

4. The regulation of banking structure

    a. Entry into banking
    b. The regulation of branch banking
    c. The regulation of bank mergers
    d. The regulation of bank holding companies

VII. International Finance

A. Foreign Exchange and the Balance of Payments

1. Basic elements of foreign exchange

    a. The nature of foreign exchange
    b. The exchange rate as a price
    c. The market for foreign exchange
    d. Role of the dealer in foreign exchange

2. The technique of foreign exchange operations

   a. Personal remittances and tourist expenditures
   b. Commercial operations
   c. Capital transfers
   d. Arbitrage
   e. Forward exchange

3. The balance of international payments

B. Mechanisms of International Adjustment

1. Equilibrium in the balance of payments

   a. The meaning of equilibrium
   b. Causes of disequilibrium

2. Income and balance-of-payments adjustment
3. Methods of price level adjustment
4. Direct controls and the balance of payments
5. Internal stability and external balance

C. International financial policy

1. Exchange rate policies

   a. Exchange stabilization
   b. Exchange control
   c. Currency warfare vs. corrective adjustment of exchange rates

2. International financial institutions

   a. The International Monetary Fund
   b. The Bank for Reconstruction and Development
   c. International Finance Corporation

3. Problems and policies of the postwar period

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3. Leland B. Yeager. *International Monetary Relations* (New York: Harper and Row, 1966).
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AREA VII

MARKETING

AREA OF COMPETENCY

MARKETING

Marketing may be defined as, "... the analyzing, organizing, planning and controlling of the firm's customer-impinging resources, policies and activities with a view to satisfying the needs and wants of chosen customer groups at a profit."[1] As can be observed in the above definition, marketing is more than selling. Marketing starts at the product development stage and is managerially involved to the post-purchase phase with the customer. In this course, we are concerned with marketing management and not with marketing from a descriptive point of view. Hence in the aforementioned definition of marketing, the management concepts of analyzing, organizing, planning, and control are mentioned. Marketing in terms of modern thinking consists of a mix of resources or ideas that are put together by the organization to fulfill predetermined objectives. The mix "... of the firm's customer impinging resources, policies and activities..." are known as the marketing mix. Marketing management has one other characteristic. That is, it must be considered as a philosophy in the organization that involves integration and coordination to satisfy a group of customers at a profit.

The definition of marketing used in this course is a broad one. In essence it consists of a total system of activities designed to produce or fulfill objectives. As stated above, the marketing mix is usually considered in marketing to delineate the various subject areas that must be "managed".

The core of marketing is basically exchange. The exchange process involves products, services, or ideas. Marketing as a subject is useful for those involved in a profit organization, a quasi-profit organization or a non-profit organization. Anyone that is concerned with exchanging or transmitting goods, services, or ideas can benefit from a course in marketing. Accordingly, this course is useful for those involved with management in all organizations-private or public.

The primary objectives of the marketing area are to provide an understanding of the role that marketing plays in society and the business firm, describe various aspects of and interrelations between the elements of the marketing mix in its application, and provide practice in the application of marketing management techniques to marketing problems and decisions.

The student will be expected to:

1. Develop a knowledge and understanding of the role that marketing plays in a society and in a business firm.

2. Develop a knowledge and understanding of current marketing theories, principles, and techniques and how these are used in the solution of marketing problems.

3. Develop an ability to analyze marketing problems, propose alternative solutions to these problems, and evaluate the costs and benefits of alternative solutions.

4. Develop an understanding of marketing's affects upon a society.

5. Develop attitudes that will promote continuing self-education after completion of formal educational programs.

This outline contains two parts: Part I pertains to the course content and Part II includes examples of the behavioral objectives that will be associated with the course.

The prerequisite for this marketing course is the first course in marketing or its equivalent. In the external degree program the course in logistics would be a prerequisite. This course is interpreted to be a second course in marketing.

PART I

COURSE CONTENT

I. Marketing Measurement

- A. Marketing Research
  - 1. Content, definitions, types
- B. Marketing Research Strategy
  - 1. Cost and value of information
  - 2. Problem formulation
- C. The Tactics of Marketing Research
  - 1. Research design
  - 2. Sources of marketing information
  - 3. Experimental designs
- D. Information from Respondents: Types
- E. Obtaining Information from Respondents
  - 1. Communication
  - 2. Observation
  - 3. Motivation research
- F. Measurement and Scaling
  - 1. Formal properties
  - 2. Psychological measurement and scaling
- G. Sampling of Respondents: Traditional
- H. Information from Respondents and Secondary Sources
- I. Statistical Techniques in the Analysis of Associated Data- chi square, multivariate techniques, regression and correlation analysis, linear discriminatory analysis, factor analysis, canonical analysis
- J. Information from Experiments
- K. Information from Simulations
  - 1. Nature and purposes - monte carlo methods, experimental gaming, heuristic programming
- L. Forecasting in Marketing Research
  - 1. Nature and techniques, e.g., extrapolation, correlation, econometrics, etc.
- M. Applications of the Bayesian Approach to Marketing

II. Consumer Behavior

A. A Behavioral Approach to Marketing
   1. Theoretical foundations
   2. Stimulus - response conceptualization
   3. Process of response
   4. The behavioral view

B. Psychological Foundations of Behavior
   1. Perception
   2. Learning
   3. Motivation
   4. Personality

C. Attitude and Attitude Change
   1. Information-processing approach to attitude
   2. Structural approach to attitude
   3. Functional approach to attitude
   4. Salience approach to attitude

D. Group Processes:The Sociological
   1. Basis of behavior
   2. Group memberships
   3. Group properties
   4. Individual response to social influence
   5. Family decision-making
   6. Group influence in industrial buying

E. Patterns of Personal Influence
   1. Nature of personal influence
   2. Opinion leadership
   3. Consumer acceptance of personal influence

F. The Impact of Culture
   1. Cultural classifications
   2. Subcultural groupings
   3. Multinational marketing

G. Social Class and Life Style
   1. Nature of social class
   2. Measuring social class
   3. Life style
   4. Social class and consumption

H. New Product Diffusion:Innovator
   Product dimension, social dimension and sociocultural dimension

III. Communication

- A. Social Role of Marketing Communication
  1. Demand stimulation
  2. Standard of living
  3. Support of mass media
  4. Promotion of public objectives
  5. Stimulation of competition

- B. Communication in the Marketing Mix
  1. The marketing concept
  2. The definition of marketing
  3. Purpose of marketing communication
  4. Stages in the buying decision
  5. Tools of the communicator
  6. Planning communication strategy

- C. The Communication Process

- D. Audience Predispositions
  1. The significance of predispositions for strategy
  2. Marketing communication objectives
  3. Sources of predispositions
  4. The selective processes
  5. Measuring predispositions

- E. Groups as Sources of Predispositions

- F. Groups as Networks
  1. Opinion leaders
  2. Innovators

- G. Individual Determinants of Persuasibility

- H. Attitudes Toward Communicators

- I. Effectiveness of Mass Versus Personal Communication

- J. Market Measurement and Forecasting

- K. Characteristics of Effective Messages
  1. Need arousal
  2. Types of appeals
  3. Message structure
  4. Frequency and repetition
  5. Perception of visual stimuli

- L. Developing Communication Objectives

- M. The Creative Process

- N. Developing Effective Salesmen
  1. Determinants of effective salesmen
  2. Recruitment and selection
  3. Training
  4. Manpower development program

O. Message Testing
    1. Measurement techniques

P. Determining Level of Effort
    1. Use of budgets
    2. Traditional approaches to budget setting
    3. The conceptual problem
    4. Models
    5. The Measurement problem

Q. Allocating Communication Effort
    1. Analytical framework
    2. Kinds of allocation problems
    3. Assigning personal selling effort

R. Qualitative Values of Mass Media
    1. Definition of qualitative value
    2. Comparative media effects
    3. Characteristics of mass media

S. Media Strategy
    1. Defining the audience
    2. Rated exposure value
    3. Basic audience measurement concepts
    4. Media audience information
    5. Media plan
    6. Media selection decisions
    7. Mathematical models

T. Evaluating Media Effectiveness
    1. Definition of media effectiveness
    2. Model for evaluating media
    3. Measuring audience characteristics
    4. Measures of impact

U. Channel Members' Roles in Strategy
    1. Channel functions
    2. Factors influencing resellers' roles
    3. Controlling resellers' performance

V. Sales Promotion, Deals and Display
    1. Objectives
    2. Role relationships
    3. Evaluation of sales promotion, deals and display

W. Packaging and Branding as Communication

X. Corporate Advertising, Public Relations and Publicity

Y. Coordinating Communication Elements
    1. Functional coordination
    2. Financial coordination
    3. Time coordination
    4. Organization
    5. Strategic planning
    6. Campaign evaluation and feedback

IV. Product and Pricing

A. The Significance of New Products
   1. Corporate growth
   2. Importance of new products management
   3. Product life-cycle

B. Developing a Product Strategy
   1. Basic concepts
   2. Determinants of product mix
   3. Product planning
   4. Product line policy
   5. Product investments
   6. Company considerations
   7. Market considerations
   8. Designing the product strategy

C. Developing New Products Internally
   1. Organizing for development
   2. Generating new product ideas
   3. Coordinating and controlling development

D. Launching New Products
   1. Commercialization problems
   2. Marketing mix factors
   3. Formulating over-all marketing strategy
   4. Testing, executing, and evaluating the program

Pricing

A. Price Theory
   1. Types and nature of pricing decisions
   2. Parties involved in the pricing process
   3. Market structures
   4. Pricing decision models

B. Pricing Programs
   1. Pricing objectives
   2. Resources required for effective pricing
   3. Information flow for pricing
   4. Pricing research: market trial, questionnaire investigation, barter experiment, statistical analysis
   5. Pricing methods: complete and partial pricing methods, price-line pricing, multi-stage approach to pricing
   6. Pricing strategies: new products, declining markets

V. Marketing Channels and Physical Distribution

A. Aspects of marketing channels: definitions, descriptions, and classifications

B. Social and Economic Values of Marketing Channels: Economic Utilities and Efficiencies

C. Distribution Channels
   1. Traditional views of channel structure
   2. Channel structure concepts
   3. Channel functions
   4. Channel objectives: engagements, adjustments, massed reserves
   5. Spatial and temporal relationships

D. Determinants and Dynamics of Distribution Systems
   1. Environmental parameters
   2. Dynamic factors

E. Management of Marketing Channels
   1. Design criteria
   2. Elements of the marketing mix and their relationships with channel structure
   3. Role relationships and mechanisms for channel control

F. Geographic Patterns
   1. Introduction and historical treatments
   2. Geomarket patterns and georeference systems

G. Physical Distribution Management
   1. Introduction: definitions, historical development, approaches

H. Marketing and Physical Distribution
   1. Physical distribution as a marketing strategy
   2. Market forces influencing physical distribution

I. Physical Distribution Systems
   1. The integrated physical distribution system: concept, activity centers, network, firm and competitive action
   2. The physical distribution mission

J. Distribution Activity Centers
   1. Transport supply
   2. Transportation rate regulation
   3. Transportation pricing and related services
   4. Nontransportation costs vs. direct transportation costs

K. Transportation Costing
   1. Costing categories: cost centers, cost concepts, and relationship of costing to pricing

L. Inventory Allocations
   1. Cost of carrying inventory
   2. Inventory control systems and objectives
   3. Time dimensions of inventory-order cycles
   4. Economic order quantities
   5. Distribution planning aspects of inventory

M. Information Flows and Physical Distribution Communications
   1. Introduction
   2. Planning and implementing a data communications system

N. Distribution Warehousing
   1. Concepts and location patterns
   2. Location strategy
   3. Functions
   4. Alternatives
   5. Location techniques
   6. Organization

O. Total Cost Planning
   1. Trade-offs
   2. Identification of cost centers
   3. Alternative distribution policies

P. Distribution System Design
   1. Basic considerations
   2. Design integration techniques: simulation modeling, comparative statics, multiple analysis, dynamic simulation, static simulation, heuristics
   3. Managerial guide to system design

VI. Control of Marketing Activities

A. Sales analysis

B. Cost analysis
  1. The nature of marketing costs: jointness, allocation problems, causality
  2. Methodology of distribution cost analysis: contribution margin versus net profit approaches
  3. Applications

C. Control Systems
  1. Definitions
  2. Marketing control devices: position descriptions, sales targets, budgets, audits, profit centers
  3. Marketing control: company subsystems, outside agents, marketing employees, program effectiveness, special projects
  4. The control process: goals, program, information, and corrective actions

D. Intelligence Systems
  1. Internal information versus external information flows

E. Channel Information and Control Systems
  1. Information systems and their linkages: the manufacturers, wholesalers, retailers, and customers
  2. Appraising distribution channel performance

PART II

BEHAVIORAL OBJECTIVES

I. Marketing Measurement: Behavioral Objectives

The student will be expected to:

1. Define the term marketing research
2. Distinguish between fundamental and applied research
3. List the types of marketing research
4. List and describe the components of a marketing research problem
5. List and describe the different types of research designs
6. List and describe the sources of marketing information
7. List the types of information that can be obtained from respondents
8. List and describe the sources of error in information from respondents
9. Prepare and test a questionnaire seeking information from respondents
10. List the means of obtaining information from respondents
11. Describe motivation research and list research techniques used in motivation research
12. Define and describe the formal properties of measurement
13. List and describe scaling methods
14. Describe the differences between probability and purposive sampling
15. List and describe specialized sampling procedures
16. Discuss and compare the traditional and Bayesian approaches to sample size determination
17. List the steps involved in analyzing sample data and drawing inferences
18. List the steps involved in ordering research data into appropriate categories
19. List and describe the considerations involved in summarizing categorized data
20. Define and describe the applications of the square analysis of classification data
21. Define and describe multivariate analytical procedures
22. Define and describe linear discriminatory analysis
23. Define and describe factor analysis
24. Define and describe canonical analysis
25. Define simulation and list simulation procedures used in analyzing marketing problems
26. List and describe marketing forecasting techniques

II. Consumer Behavior: Behavioral Objectives

1. Define the term consumer behavior
2. List the factors that influence the consumer in the purchasing decision process
3. Define the terms perception, learning, motivation, and attitude
4. List the groups that influence the purchasing decision
5. Define the groups that influence the purchasing decision
6. List the characteristics of a typical opinion leader
7. Define the term culture
8. Explain in a concise manner specifically how culture may be related to the marketing mix
9. Define the term social class
10. List five (5) ways indicating how class is directly related to consumption behavior

11. List and explain how the concept perception may be used in marketing
12. List and explain how the concept motivation may be used in marketing
13. List and explain how attitudes may be changed
14. Define the term, "life-style"
15. Define and explain the term, "reference group"
16. List ways that the reference group concept may be used in marketing
17. List the differences and the similarities that exist between an industrial buyer and a household buyer
18. List the characteristics of a typical innovator
19. Draw and briefly explain the diffusion process
20. List the reasons why one should understand the consumer when applying the subject of marketing

III. Communication: Behavioral Objectives

1. List the decision stages in a communication plan
2. Draw a communication process
3. List the sources of audience predispositions
4. List the individual determinants of persuasibility
5. Choose the variables that contribute to mass communication effectiveness
6. Choose the variables that contribute to personal communication effectiveness
7. List the characteristics of effective messages
8. Develop a method that may be used to determine the level of communication effort
9. List and briefly discuss four (4) kinds of allocation problems
10. Draw the process of campaign effects
11. List the functions of communication in an organization
12. List six (6) communication objectives and indicate why they are or maybe effective
13. List and discuss the stages in the creative process
14. List and discuss the determinants of salesmen effectiveness
15. Draw a model for message testing
16. List and discuss six (6) measurement techniques for message testing
17. List and discuss the qualitative values for mass media
18. List and discuss the dimensions of the media plan
19. Define and show the relationship between advertising, personal selling, promotion, publicity, and public relations
20. Draw the control process in marketing communication management

IV. Product and Price: Behavioral Objectives

1. List the importance of new products to a firm
2. Draw the product life-cycle and show important managerial implications
3. List and briefly discuss the factors that are involved in developing a product strategy
4. Draw an organizational chart indicating the optimum form of organization that may be considered in new product development
5. Show through a calculation a new product development controlling procedure
6. List and briefly discuss the steps involved when launching a new product

7. Define what is meant by the term, "price
8. List and describe the types and nature of pricing decisions prevalent in business firms
9. List the parties involved in the pricing process and discuss the nature of involvements
10. List and discuss the effects that market structures have upon pricing policies
11. List and discuss pricing decision models
12. List and describe pricing objectives
13. Describe business resources required for effective pricing
14. Describe information flow requirements for effective pricing
15. List and describe different types of pricing research
16. List and describe pricing methods
17. List and describe pricing strategies

V. Marketing Channels and Physical Distribution: Behavioral Objectives

1. Define and describe marketing channel systems
2. List the various ways in which channels may be classified
3. Define the following channel objectives:
   - a. Minimum possible engagements
   - b. Maximum postponements in adjustment
   - c. Minimum massed reserves
4. Define and characterize middlemen
5. Discuss the spatial and temporal relationships inherent in channel systems
6. List and describe the design criteria for channel systems
7. Discuss and contrast the effects that channel systems have upon the marketing mix
8. Discuss role relationships in channels of distribution
9. Describe hypothesis of the forces creating dynamic change in channel systems
10. Describe implications of georeference patterns for the distribution of goods and services in an economy
11. List the criteria for the design of a georeference system
12. Describe basic types of georeference systems
13. Define physical distribution management
14. Discuss the historical development of physical distribution in the U.S. economy
15. List the major components of a business firm's physical distribution system
16. List and describe the legal forms of transport
17. List carriers exempted from direct government regulation
18. List government transportation regulating agencies and modes of transportation covered under regulation
19. List the cost centers used in determing transportation costs
20. List and discuss the objectives of inventory control systems
21. Define the term economic order quantity and present a graphical interpretation of its application and value
22. List the factors involved that influence the functioning of a communications system
23. List and describe the types of distribution structures that evolve when distribution warehouses are adopted

24. List and describe location strategies according to product differentiation considerations
25. List and describe distribution warehouse functions
26. List and compare warehouse alternatives
27. Define and describe the objective of total cost planning
28. List cost centers relevant to total cost analysis
29. List and discuss alternative distribution policies
30. List and describe distribution system design integration techniques
31. List the components of a distribution system audit

VI. Control of Marketing Activities: Behavioral Objectives

1. List and describe the various kinds of sales analysis
2. Define distribution/marketing cost analysis
3. List and discuss measurement problems encountered in distribution cost analysis
4. Describe the steps involved in distribution costs analysis
5. Compare and discuss the net profit and contribution margin approaches to distribution cost analysis
6. Apply distribution cost analysis approaches to a marketing problem
7. List and describe marketing control devices
8. List and describe the elements of a marketing control system
9. Describe and discuss the elements in a marketing control process

AREA VIII

OPERATIONS MANAGEMENT

AREA OF COMPETENCY

OPERATIONS MANAGEMENT

Involves an interrelated approach to the management of the resources which are necessary for the creation of goods and/or services. The management, planning and control of operations are considered as separate and distinct functions. The systems approach is used to show the primary and secondary relationships which are necessary for the most effecient forms of organization.

OPERATIONS MANAGEMENT

OPERATIONS PLANNING & CONTROL

SYSTEMS ANALYSIS

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Area of Competency

Operations Management

Operations management involves the management of the resources which are required to create products and/or services. As needs have changed and as technological developments have emerged, the requirement for an adaptive capability in management has become paramount. The impact of computers and automation has created a situation in which the manager must be capable of dealing with his organization in a broadly based way with information networks linking all relevant components.

The origins of operations management were in the scientific management movement shortly after the turn of the century. Since this movement and subsequent decades of development occurred in a manufacturing or industrial setting, many of the concepts and techniques developed in this field represent this setting. The modern notion of operations management, however, is broadening rapidly. Paralled decisions have been found in business administration, hospital administration, education administration, engineering administration, public administration, and social work administration. These common decisions indicate that in the years ahead many applications of the concepts in operations management will be made throughout society.

In addition to the management of production systems in general, this area is concerned with production system design and the subsequent planning, analysis, and control of production systems. A statement of learning objectives, a topical outline, and bibliography follows.

Area of Competency

Operations Management

Objectives:

The primary objective of this initial area in operations management is to provide an understanding of the design of a production system as well as the planning, analysis, and control activities associated with the management of operations.

The student will be expected to be able:

1. To define inputs, processes, and outputs in an operations management setting.
2. To list the factors to be considered in a plant location decision.
3. To evaluate the tradeoffs among location factors.
4. To distinguish among types of layouts.
5. To analyze layouts using flow process charts, flow diagrams and precedence graphs.
6. To solve problems in layout using queuing theory.
7. To explain principles of materials handling.
8. To designate factors to be considered in making materials handling decisions.
9. To solve materials handling problems using the transportation method of operations research.
10. To evaluate the human factors in job design.
11. To describe the research and development procedure.
12. To solve research scheduling problems with PERT.
13. To distinguish between open and closed-loop feedback in automation.

14. To describe several types of production control.
15. To distinguish between control systems for intermittent and continuous process production systems.
16. To solve forecasting problems using least squares regression, weighted moving averages, and exponential smoothing.
17. To solve problems associated with determining the optimum production lot size.
18. To use linear programming to determine the optimal product mix.
19. To explain how simulation is used in production planning.
20. To explain the purchasing procedure.
21. To explain the conditions affecting decisions to make, buy, or lease products and services.
22. To describe value analysis.
23. To solve economic order quantity problems.
24. To discuss the derivation and behavior of the variables in the EOQ model.
25. To solve reorder point problems.
26. To develop a quality control program utilizing mean charts, range charts, p charts, and c charts.
27. To describe several acceptance sampling plans.
28. To explain the use of flow process charts, operator process charts, micromotion charts, and simultaneous motion charts.
29. To describe work measurement procedures.
30. To describe the various time-based and output-based wage systems.
31. To describe job ranking, classification, factor comparison and point plans as approaches to job evaluation.

Area of Competency

Operations Management

Topical Outline

I The Management of Production Systems

1. The objectives of production
2. The concept of a production system
3. Basic types of production systems
4. Problems pertaining to production systems
5. The relationship of production to other areas of the firm
6. The production manager and the production system
7. The production manager and the firm
8. The production manager and the environment of the firm

II Production System Design

A. Location of the Plant

1. Importance in production system design
2. The plant location decision
3. The choice of the community
4. The choice of the site
5. Sources of information in plant-location analysis
6. Plant location trends

B. Layout of Facilities

1. Objectives of plant layout
2. Basic types of layouts
3. Process layouts
4. Product layouts
5. Combinations of process and product layouts
6. Fixed-position layouts

7. Cost comparisions by type of layout
8. Factors affecting layout
9. Quantitative analysis in plant layout

C. Materials Handling

1. The risks of inefficient materials handling
2. Principles of materials handling
3. Materials handling devices
4. Factors affecting materials-handling decisions
5. Analytical methods in materials handling

D. Research and Product Development

1. Types of research
2. Organizing for research and development
3. Management of researchers
4. The innovation cycle
5. Patents
6. Product development
7. The developmental procedure
8. The use of PERT in product development
9. Project milestone schedules
10. Cost control in R&D management
11. Product design

III Planning, Analysis, and Control of Production Systems

E. Production Planning and Control

1. The functions of production planning and control
2. Types of production control
3. Computers and data processing in production planning and control
4. Methods of overcoming fluctuations in demand
5. Forecasting of requirements
6. Techniques of forecasting

F. Decision Models in Production Planning and Control

1. Determination of the optimum production lot size
2. Using linear programming to determine optimal product mix
3. Linear programming applied to job assignment
4. Gantt chart applications to scheduling
5. The use of PERT in production planning and control
6. The systems framework of production scheduling
7. Simulation of flow rate, volume, and capacity interaction patterns

G. Procurement

1. The objectives of the procurement department
2. The purchasing procedure
3. Determination of sources of supply
4. Determination of prices
5. Make, buy, or lease decisions
6. Value analysis
7. Systems contracting
8. Operations research in procurement
9. Legal and ethical aspects of procurement

H. Inventory Control

1. Objectives of inventory control
2. Cost factors in inventory control
3. Economic order quantities
4. Reorder points
5. The inventory control procedure
6. Inventory control systems
7. The dynamics of inventories
8. The effect of value and usage on inventory control.

I. Inspection and Quality Control

1. Purposes of inspection and quality
2. The concept of quality
3. When, where and how much to inspect
4. Feedback and the inspection process
5. Variables and attributes in inspection
6. Sources of quality problems
7. Inspection devices

J. Statistical Quality Control

1. Quality control charts
2. Control limits and tolerance limits
3. Control chart applications
4. Control of attributes
5. Control chart for percentage defective
6. Applications of p charts
7. Acceptance sampling

K. Methods Analysis

1. Objectives of methods analysis
2. Motion-study techniques
3. Motion-study principles
4. Analysis of therbligs
5. Micromotion study
6. Process charts
7. Attitudes toward motion study

L. Work Measurement

1. The purpose of time study
2. The time-study analyst
3. Time-study methods
4. Performance rating
5. Allowance factors
6. Synthetic time study
7. Limitations of time study

M. Wage Incentives and Job Evaluation

1. Wage systems based on time
2. Wage systems based on output
3. Other types of wage incentive system
4. Guidelines for successful wage incentive systems
5. Job evaluation
6. Guidelines for successful job evaluation systems

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Area of Competency
Operations Planning and Control

Operations planning and control covers a wide variety of topics all of which are not strictly divided along either planning or control aspects, but rather are viewed as general problem areas combining both planning and control aspects. Project management is one such example. It has only been relatively recently that management has viewed project management as a distinct and separate aspect although it has always existed in the past. Both PERT and CPM have advanced the state of the art considerably, aothough both have serious drawbacks. The possibilities of combining the advantages of both techniques looks promising, but as yet has not successfully been accomplished. Both information purchasing and bid making as well as the control aspects of network management are emphasized.

Production-inventory systems constitute one of the major responsibilities of the operations manager. Prior to any planning or control, adequate forecasts of future needs must be made. Among the various statistical techniques available, exponential smoothing appears to be quite promising. Besides knowing the various inventory models available, it is essential to know their limitations and pitfalls since as yet there is no universal inventory model. Actually inventories are just a part of the aggregate production planning and scheduling problem since employment levels and production rates are to an extent dependent upon the level of inventory. Several mathematical and heuristic programming models are available to assist the decision maker in handling this even larger problem.

The problems of planning and scheduling differ considerably for high volume items as contrasted with low volume production levels. Problems associated with high volume center around the establishment of information feedback systems and small scale sequencing of operations, i.e. line balancing. Low volume problems are associated with the layout of facilities and the scheduling of a variety of jobs with several operations restricted by both men and equipment. Again, both mathematical and heuristic models are available to assist the decision maker.

The quality of the products being produced is of utmost importance. Several statistical techniques are available to economically assist in the control of quality. Mathematical models are of some help for planning purposes.

The facility itself along with its replacement and expansion are also decisions to which the operations manager addresses himself. These problems are somewhat complex due to the dependence of the alternatives available which should be made known to the operations manager.

Objectives

Operations Planning and Control

1. The student should understand the underlying theory of program evaluation and review technique including its assumptions and inherent errors.
2. The student should also understand the critical path method, its assumptions and pitfalls.
3. The student should be aware of both the advantages and difficulties of combining the approaches of CPM and PERT.
4. The student should have a knowledge of the methods available for determining the proper amount of additional information to be obtained.
5. With respect to project bid making, the student should be aware of not only his costs, but also his competitor's costs and information.
6. The student should be aware of the advantages of controlling a project with the aid of a network.
7. The student should be aware of several of the statistical forecasting techniques including exponential smoothing.
8. The student should know the basic inventory models, their assumptions, and interactions among the various kinds of inventories.
9. The student should understand the aggregate production, employment, and inventory problem and how the various outside influences effect the nature of the problem.
10. The student should know the mathematical methods, including the linear decision rule and the simplex approach, for solving the aggregate production, employment, and inventory problem.
11. The student should also know the various heuristic programming and computer search techniques for solving the aggregate production, employment and inventory problem.
12. The student should have a knowledge of the particular problems associated with planning and scheduling of high volume items, and in particular, the assembly line balancing problem.
13. The student should also be aware of the problems and various solutions associated with low volume production such as the layout problem and the job shop scheduling problem.

14. The student should also understand the scope of the quality planning and control management problem as well as the means for handling them, i.e. sampling, effective control, and facility design.

15. In regard to the problem of equipment replacement, the student should be aware of the interaction between alternatives, their physical detoriation, and their future technological innovations.

16. The student should understand some of the complexities of expanding facility capacity.

17. With respect to the problem of determining the proper mix between preventive and repair maintenance, the student should be aware of the various models available for solving the problem.

18. The student should be aware not only of the economic considerations involved in site location, but also of several of the models available for assisting in solving this problem.

Area of Competency
Operations Planning and Control

Topical Outline:

- I. Project Management
    - A. Program evaluation and review technique
        - 1. The concept of network based management
        - 2. The basic statistical concepts of PERT for project completion times
        - 3. The assumptions of independence and ignoring parallel paths
        - 4. The Beta Distribution
        - 5. Other errors associated with PERT
    - B. The critical path method
        - 1. The deterministic assumption
        - 2. The concept of the time-cost trade-off
        - 3. The cost versus duration concept
        - 4. Optimal crashing for a multi-level project
    - C. The realities of combining PERT and CPM
        - 1. The assumption of cost being a function of duration
        - 2. Crashing a project with probabilistic times and costs
    - D. Obtaining the proper information
        - 1. The need for additional information on costs and time
        - 2. The cost of obtaining additional information
    - E. Project bid making
        - 1. Analysis of competition and costs
        - 2. Time-cost trade-off from the client viewpoint
    - F. Network based control systems
        - 1. Proper monitoring
        - 2. Contingency planning

II. Production - Inventory Systems

- A. Statistical forecasting for inventory control
  - 1. Some of the more common statistical models
  - 2. Exponential smoothing
- B. Inventory models
  - 1. The classical inventory model and its assumptions
  - 2. Lot sizes for production runs
  - 3. The problem of multiple products
  - 4. The concept of a safety or buffer stock
  - 5. Dynamic inventory models
- C. Aggregate production, employment, and inventories
  - 1. Recognition of the problems as an intermediate term problem
  - 2. Master production plans and schedules
  - 3. The cost of changing rates of production
  - 4. The process of aggregate planning and scheduling
  - 5. Mathematical methods of aggregate planning
    - a. The use of linear programming for aggregate planning
      - (1) Review of the simple linear programming model
      - (2) Use of the distribution method for solving the aggregate planning problem
        - (a) Computer packages available
        - (b) Use of the simplex for solving the aggregate planning problem
    - b. The linear decision rule
      - (1) The scope and nature of the linear decision rule
      - (2) The derivation of the rule and its assumptions
      - (3) The inherent difficulties of implementing the rule

6. Heuristic programming methods of aggregate planning
    a. Introduction to heuristic programming
    b. Management coefficients model
    c. Parametric production planning
    d. Computer search methods

III. Planning and Scheduling for High Volume Items
  A. Scheduling in a broad context
    1. Design of the production system
    2. Scheduling of personnel and facilities
    3. Establishment of the system feedback
  B. Operation sequencing
    1. The problem of line design
    2. The assembly line balancing problem
      a. Basic methodology
      b. Heuristic programming methods

IV. Planning and Scheduling for Low Volume Items
  A. The facility layout configuration problem
    1. The problem and its considerations
    2. Computer simulation and heuristic methods
  B. The job shop scheduling problem
    1. The scope of the problem; i.e. deterministic versus probabilistic
    2. Machine limited scheduling rules
    3. Worker restriction scheduling rules
    4. The problem in a dynamic nature
    5. Computer assisted scheduling models

V. Quality Planning and Control
  A. The nature of the quality planning and control problem
  B. Quality planning
    1. Determination of proper quality level
    2. Low versus high volume quality planning
  C. Quality control through sampling
    1. Review of Bayesian statistics
    2. Operating characteristics curve
    3. Fixed sample plans
    4. Multiple sample plans
    5. Variable sampling plans
    6. Economics of sampling
    7. Economic acceptance plans
    8. Sampling in a multi-step operation
  D. Statistical quality control
    1. Various control charts
    2. Process control and process capability
    3. Establishment of an overall control system
  E. Facility design for quality control
    1. Location of inspectors on an assembly line
    2. Use of mathematical models
  F. The human factor in quality control

VI. The Determination of Proper Facility Size and Replacement
  A. Review of basic concepts of investment decisions
  B. Uncertainty and its impact on proper facility size

- C. The capital budgeting problem
    - 1. Problems of determination of proper return on equipment replacement
        - a. The dependence between alternatives
        - b. Multiple use problems
    - 2. The capital budgeting system
- D. Equipment replacement problem
    - 1. Determination of physical detoriation
    - 2. Determination of impact of technological changes
    - 3. MAPI as a means for solving the problem
- E. Capacity Expansion
    - 1. The nature of the problem
    - 2. Indivisibility of assets
    - 3. Autonomous investment
    - 4. Capacity determination under risk
    - 5. Strategic and competitive considerations
- F. Maintenance considerations
    - 1. Scheduling problems
    - 2. Preventive versus repair maintenance
    - 3. Various models for maintenance planning

VII. Facility Location

- A. Economic considerations for site location
- B. Facility location in practice
- C. Models for determination of proper location
    - 1. Simulation studies
    - 2. Programming models

Operations Planning and Control

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Area of Competency
Systems Analysis and Operations Management

In an age of computers and space exploration, we are confronted with exciting breakthroughs in knowledge which radically change our perspectives. Inherent in many of these bold forward strides is the application of the systems concept. This area explores the possibilities of the use of that concept in the field of operations management.

Among the early topics covered in this area are systems design and systems analysis. In these areas the fundamental concepts and definitions required are developed. The concept of flow patterns and flow networks is explored along with the utilization of models and simulation at critical decision points.

Another critical area in systems analysis is an exploration of the environment within which the system exists. In this case, where the system is defined as the firm, the environmental relationships concern customers, competitors, communities, labor unions, stockholders, banks, suppliers, and governments. Symbiotic and synergistic relationships are explored in each of these interfaces as well as the disequilibrium inducing aspects of the relationships.

Since the systems approach to management poses significant alternatives to traditional or classical management theory these matters become of concern as well as the systems challenge to the human relations, behavioral or neoclassical school of management thought. Functionalism, span of control, unity of command, and line-staff provide conceptual foci for a contrapuntal cacaphony.

The firm is viewed as a system composed of a series of flow networks which are specified in terms of the resources required to produce products and/or services. These include materials, manpower, money, machines, facilities, and energy. Obviously, all of these networks are linked by an integrated information system.

From this point forward, attention is given to the convergence-divergence patterns inherent in systems, tracking systems, and flow network dynamics. These dynamics rest primarily on studies of volumes, capacities, and flow rates.

The organizational aspects of the systems approach are also explored. In the absence of such traditional familiarities as hierarchies, functional divisions, transient superior-subordinate relationships, etc. newer forms of management are developed based on team management with special emphasis on the tactical and strategic capabilities of such teams.

Finally, a comparative analysis of management systems is explored which views the commonalities among health care systems, educational systems, transportation systems, governmental systems, and military systems.

Area of Competency

Systems Analysis and Operations Management

Objectives:

The primary objective of this capstone area in operations management is to provide an integrative framework for the concepts and techniques included in operations management. This framework is constructed on the systems concept and involves integration and synthesis of the decisions made throughout the organization as well as the organizations dynamic response to its environment.

The student will be expected to be able:

1. To define systems terminology including the terms system, input, output, transformation process, synergy, symbiosis, state, feedback, feedforward, etc.
2. To conceptualize flow networks in a variety of organizations
3. To evaluate the operation of a system in several states i.e. steady, equilibrium, exploding, oscillating, etc.
4. To describe the decision process from a systems viewpoint
5. To identify models used in decision making at specific decision points
6. To critically evaluate the relevance of models at specific decision points
7. To modify existing models or create new models where needed in the system
8. To operate and evaluate a computer aided management simulation model
9. To construct a simulation model where applicable in the system design
10. To objectively evaluate the interfaces in the environmental set and determine the symbiotic interchanges or lack thereof.
11. To create new concepts and approaches where non-symbiotic behavior is present which induces systemic disequilibrium, e.g. labor negotiations
12. To conceptually modify organizations in the environment to achieve a capability for adaptive or dynamic equilibrium.

13. To evaluate the objectives of a variety of organizations in the environment in terms of myopic stereotypes and suggest alternate and compatable interorganizational objectives
14. To critically evaluate classical, neoclassical, and systems concepts of management
15. To create new organizational designs which are not based on traditional concepts of hierarchy, line-staff, functionalism, etc.
16. To explore the ramifications of changing organizations from one design to another to achieve a systemic balance
17. To determine all of the critical decision points in a materials flow network
18. To determine all of the critical decision points in a money flow network
19. To determine all of the critical decision points in a manpower flow network
20. To determine all of the critical decision points in a machine, facility, and energy flow network
21. To create information systems to connect all of these decision points
22. To evaluate the response patterns of the systems designed to impacts generated within and outside the organization
23. To create conceptually management teams responsible for planning, analysis, and control determining such things as size, training of members, how they are acquired and removed, etc.
24. To develop alternative concepts of conflict resolution which could be utilized in a team environment

Area of Competency

Systems Analysis and Operations Management

Topical Outline

A. Systems Design

   1. The challenges and opportunities of the systems concept
   2. The nature of systems
   3. The flow pattern of a system
   4. System states

B. Systems Analysis

   1. The systems concept and decision making
   2. Models
   3. Simulation
   4. A procedure for the development of systems

C. The Environmental Systemic Construct

   1. The environmental set
   2. Relationships with customers
   3. Relationships with competitive firms
   4. Relationships with communities
   5. Relationships with labor unions
   6. Relationships with stockholders
   7. Relationships with banks
   8. Relationships with suppliers
   9. Relationships with governments

D. Organization Theory: Classical, Neoclassical and Systems

1. Classical organization theory versus systems
    a. Functionalism
    b. Span of control
    c. Unity of command
    d. Line-staff
2. Neoclassical organization theory versus systems
    a. Functionalism
    b. Span of control
    c. Unity of command
    d. Line-staff

E. The Firm as a System

1. The objects in the system
2. The materials flow network
3. The money flow network
4. The manpower flow network
5. The machine, facility, and energy flow network
6. The information system

F. Materials Flow Networks

1. Input-process-output sequence of systems
2. Input phase - procurement
3. Process phase - production
4. Output phase - marketing
5. Flow network linkage - transportation

G. Flow Network Patterns

  1. Convergence patterns from suppliers to the firm
  2. Convergence-divergence patterns within the firm
  3. Divergence patterns through channels of distribution
  4. Tracking materials flow through the network

H. Flow Network Dynamics

  1. Determination of the capacity of the network
  2. Analysis of rates of flow throughout the network
  3. Analysis of volume changes within the network
  4. Planning, analysis, and control of volume, flow rates, and capacity
  5. Computer simulation of material flow network dynamics

I. Management of the Flow Networks

  1. Establishing an information system for tracking
  2. The development of planning, analysis, and control centers
  3. Planning, analysis, and control management teams
  4. Tactical and strategic management activities

J. Comparative Analysis of Management Systems

  1. Health care systems
  2. Educational systems
  3. Transportation systems
  4. Governmental systems
  5. Military systems

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AREA IX

PERSONNEL AND INDUSTRIAL RELATIONS

PERSONNEL AND INDUSTRIAL RELATIONS

The broad objective of study in the functional field of Personnel and Industrial Relations is to encourage recognition of the importance of individual people in organizations, to develop a conceptual understanding of the fundamental relationships between individuals and the organizations of which they are members, and to provide familiarity with the many specific techniques which have developed and are being developed to facilitate a mutually productive relationship between individuals and their organizations. Management in general, and personnel management specifically, is more than a tool kit of techniques for getting work done through people. Awareness of the full meaning of the term Personnel and Industrial Relations involves awareness of the fact that personnel are people, and that every manager is a manager of people.

All work is done through and by people, and the success of any work-organization is ultimately tied to its' success in stimulating and coordinating the activities of the people who make up the organization. Organizations are groupings of people with common or shared goals. Therefore, the organizational function directly involving the recruitment, selection, placement, training, compensation and development of people within the organization is a critical function whether done in an ordered and highly sophisticated fashion or on a simple cut and fit, trial and error basis.

In studying Personnel and Industrial Relations, three levels of understanding are involved. First the fundamentals of social organization must be understood...the concepts that are common to all forms of organization, and the generalizations that may be made for similar conditions, in certain organizational situations. Once we comprehend the difference between solitary individual behavior and individual behavior within groups and organizations, the next step is to understand the specific, detailed tools and techniques that have been developed to deal effectively with collectivities of individuals. The third aspect involves the skills and experience necessary in the application of these personnel systems and techniques in actual organizational situations... on the job. Traditionally, the study of personnel management has focused on the second element. Personnel managers have worked out these techniques and have told others how to apply them objectively; academicians in the social sciences have worked on the basic concepts and tried to develop valid generalizations; operational managers have practiced the art of managing personnel at work, usually with little direct support or guidance from either of the two other principals. Personnel and Industrial Relations today has reached the point where all three elements are recognized as portions of the same problem area, and this course is built around the presentation of all three.

The student will be expected to demonstrate:

1. Awareness and understanding of the role of people in the business setting.
2. Appreciation for the complexity of the individual and groups as they meet in the workplace.
3. Knowledge of a number of approaches to the selection, placement, training, compensation, supervision and behavior of the man who comes to work.
4. Knowledge of the business climate and the roles of the people who work within it.
5. Some knowledge and understanding of the union-management relations that are part of the total picture of employee relations.
6. An appreciation of people who are the decision-makers and doers at every level in the organization.

7. The development of a set of fundamentals founded on theory and tested in practice that should make each student a better manager.

8. Understanding of the basis for individual contributions to organizations.

9. Understanding of how to influence the behavior of the participants in an organization.

10. Awareness of the appropriate use of rewards and punishment in influencing behavior.

11. Ability to describe the personnel and industrial relations function and its relation to the primary service functions of the organization.

12. Comprehension of the motivational bases for human behavior in organization.

13. Understanding of the various forms of compensation used by organizations and the reasons why these act as inducements.

14. Knowledge of the various systems and techniques in use in the area of personnel and industrial relations, and of the means for making meaningful application of these techniques.

15. Knowledge of the areas of organization where problems of personnel management are manifesting themselves.

PART I. The World of Work

A. Social Organization: An Overview

1. Authority Systems
   a. Traditional
   b. Personal
   c. Rational-Legal

2. Organizational Structure
   a. Household or Tribal Form
   b. Task-Force or Project Form
   c. Bureaucratic or Operational Form

B. Business Organizations: Focus on the Work Place

1. The Nature of the Business Organization
   a. Basis for Decision-Making: Authority
   b. Framework for Decision-Making: Structure

2. Functions Performed within the Organization

3. Changing Aspects of Organization

4. Idealized (formal) and Operational (informal) Organization
    a. Groups in Organizations
    b. Dimensions of Group Behavior
    c. Positive and Negative Aspects of Group Behavior

C. People - The Individuals Who Come to Work

1. Individual Behavior in Employment - Work
    a. Performance as a Function of Motivation and Ability
    b. Performance as a Function of Perceptions and Expectations
    c. Work Values and the Meaning of Work
    d. Changing Patterns of Work and Non-Work Activities

2. Human Motivation
    a. Needs and Motives
    b. Job Satisfaction and Morale
    c. Work Values and the Meaning of Work
    d. Changing Patterns of Work and Non-Work Activities

3. Human Ability, Skill, and Capacity
    a. Intellectual Qualities
    b. Manual/Manipulatory Qualities
    c. Actualized Skills, and Potential Capacities

4. Human Responses to Frustration - Defense Mechanisms
    a. Increased striving to overcome obstacles
    b. Withdrawal from the Situation
    c. Seeking Alternate Paths to Goals, or Alternate Goals

5. Generalizations About Humans and Human Behavior
    a. Individual Differences and Individual Similarities
    b. Different Views of Individual Personality
    c. Individual and Group Behavior

D. Managers - The Management of People at Work

1. The Functions of Management
    Planning, Organizing, Staffing, Implementing,
    Developing, Controlling

2. The Components of the Managerial Role
    a. Administration
    b. Leadership

3. Delegation, Responsibility, and Accountability
4. Changing Aspects of the Managerial Role

E. The Personnel Function and the Role of Personnel Management in the Organization

1. The Function and its Various Labels
   Industrial Relations, Personnel Management, Labor Relations, Employee Relations, or Human Resource Management
2. The Personnel Function as Performed Within the Personnel Department
   a. Staff Role - Providing Personnel Management Systems
   b. Line Role - Running the Personnel Department
3. The Personnel Function as Performed by Operating Managers

F. History of Personnel Management

1. Early Industrial Psychology
2. Paternalism and the Beginnings of Personnel Management as a Separate Functional Area
3. The Hawthorne Studies
4. World War II and Its Effects
5. Human Relations Approach
6. Human Resource Management
7. Organizational Development

PART II. ELEMENTAL PROCESSES IN PERSONNEL MANAGEMENT

A. Organizational Planning

1. Establishing Organizational Structure
   a. Appropriate Overall Framework - Taskforce and Operational types of Organization (Project vs. Bureaucratic Organization)
   b. Task and Person Specialization
   c. Departmentation
   d. Job Design and/or Job Analysis
   e. Job Descriptions
2. Establishing Administrative Patterns and Procedures
   a. Relationships Between Jobs
   b. Standard Operating Procedures
   c. Work Rules

- d. Performance Standards
- e. Personnel Policies and Strategies

B. Staffing Process

1. Manpower Planning
    - a. Forecasting Organizational Requirements
    - b. Manpower Inventories - Available Human Resources
    - c. Job Specifications - Establishing Position Requirements
    - d. Labor Force Surveys

2. Recruitment of Personnel
    - a. Determining the Personnel Required
    - b. Techniques for Attracting Qualified People
    - c. Public Relations Aspects of Recruiting
    - d. Special Groups as Sources for Employees (i.e. Handicapped, Women, Aged, Vererans, Minority Group, etc.)

3. Evaluation of Those Recruited
    - a. Application Blank and the Resume
    - b. Physical Examinations
    - c. Interviewing Techniques
    - d. Reference Checking
    - e. Psychological Testing - Utility and Limitations: Validity and Reliability of Instruments

4. Selection from Among Those Recruited and Evaluated
    - a. Types of Strategies for Selection - Successive Hurdles, Multiple Correlation, and Discriminative Analysis
    - b. The Role of the Operational Manager in the Staffing Process - Consultation

5. Placement
    - a. Placing the Appropriate Person in the Right Position
    - b. Assessing the Effectiveness of the Entire Staffing Process

6. Problems of Deselection
    - a. Termination for Disciplinary Reasons
    - b. Separations Due to Changes in Personnel Requirements
    - c. Retirements and Normal Turnover

C. Training and Development Process

1. Training Techniques
    - a. Fundamentals of Learning and Learning Curves
    - b. In-House Training Programs
    - c. External Training Facilities
    - d. Utilization of Educational Institutions
    - e. Multiple Approaches

2. Induction and Orientation to the Organization

3. Skill Training
    a. Vestibule Training Programs
    b. On-the-Job Training
    c. Apprenticeship Programs

4. Personal Development
    a. Non-Managerial Personnel
    b. Technical Personnel
    c. Managerial Personnel
    d. Professional Personnel

5. Programs for Training and Development
    a. Management by Objectives
    b. Work Planning and Review
    c. Participatory Management
    d. Production Sharing

D. Compensation Process

1. Wage and Salary Administration
    a. Wage Policies
    b. Job Evaluation
    c. Wage Surveys
    d. Wage and Hour Laws
    e. Wage Structure - Levels and Differentials

2. The Provision of Employment Stability
    a. Job Security and Job Seniority
    b. Organizational Stability

3. Methods of Compensation
    a. Direct Payment for Normal Performance
        i. Time Worked - hourly pay
        ii. Work Performed - skill level and/or piece-rate
    b. Indirect Payment for Normal Performance - Vacations, Holidays, Services, etc.
    c. Deferred Payment for Normal Performance - Pensions, Hospitalization, Sick Leave, etc.
    d. Direct Payment for Unusual Performance - Overtime, Hazardous Duty, Suggestions, etc.
    e. Indirect Payment for Unusual Performance - Credit, Praise, Honors, etc.
    f. Deferred Payment for Unusual Performance - Promotion, Advancement, Profit-Sharing, etc.

4. Determination of Employee Satisfactoriness - Performance Appraisal
    a. Employee Evaluation
    b. Management Evaluation
    c. Peer-group Evaluations, Self-Evaluations, Superior Evaluations

5. Determination of Employee Satisfaction
    a. Job Attitudes, and Morale Surveys
    b. Evaluation of Turnover, Absenteeism, Grievance Rates, etc.
    c. Evaluation of Productivity

E. Representation Process

1. Dealing with a Total Work Force of Individuals on a Collective Basis
    a. Union Employees
    b. Non-Union Employees

2. History of the U.S. Labor Movement
    a. Goals of the Labor Movement
    b. Role of Government in the Labor Movement
    c. Industrial Unions and Craft Unions
    d. Blue-collar, White-collar, and Professional Unions

3. Organizational Strategies for Dealing with Unionization
    a. Union Exclusion
    b. Union Acceptance
    c. Union-Management Cooperation

4. Collective Bargaining Through Trade Unions
    a. The Organizing Phase
    b. Types of Representation (Closed Shop, Open Shop, Union Shop)
    c. Contract Negotiation
    d. Contract Application and Interpretation
    e. Grievance Procedures and Impasse Settlement
    f. Arbitration, Mediation, and Fact-Finding

5. The Future of Individual Bargaining, Collective Bargaining, and Trade Union Representation

PART III. SUPPLEMENTAL PROCESSES IN PERSONNEL MANAGEMENT

A. Ancillaray Services Provided Through the Personnel Department

1. Record-Keeping - Information on Individuals
    a. For Organizational Uses
    b. For Government Uses

2. Employee Services
    a. Health and Safety, Medical Services on the Job
    b. Food Services
    c. Banking and Credit Services
    d. Personal Counselling

3. Organizational Communications - Keeping People Informed
    a. General Information for Employees - Memos, Tax Notes, etc.
    b. Work Related Information for Employees - Standard Forms, etc.
    c. Organizational Information for Employees - Company Newspapers, Company Reports,etc.

   - d. Information for Non-Employees - Public Relations, Magazines, etc.
   - e. Suggestion Systems

B. Supervisory Process - Personnel Functions that can be Performed only by the Immediate Supervisor. (The basic systems may be established by the Personnel Department, but the activities must be carried out by the supervisor.)

1. Training and Coordinating
   - a. Assigning Work, and Translating Job Descriptions, Work Rules, and Performance Standards into Meaningful Actions by Subordinates
   - b. Keeping Subordinates Informed
   - c. Initiating and Maintaining Group Responsiveness, Building a Task-Group and Keeping it Intact, Developing Team Work and Cooperation
   - d. Detecting and Correcting Incipient Non-Response, Shaping Behavior into Appropriate Patterns

2. Stimulating and Influencing
   - a. Pre-task and Post-task Motivation - Praise, Promotions, Transfers, Discipline, Performance Appraisal, etc.
   - b. Responsiveness to Individual Needs for Aid and Support - Providing Help as Needed or Asked for, etc.
   - c. Representation of Individual Subordinates within the Organization - Handling Grievances, Working for Appropriate Rewards, Representing Subordinates in Dealings with other Work-Groups, etc.

C. Personnel Management and Government Regulation

1. Fair Employment Practices Act

2. Civil Rights Laws

3. Equal Employment Opportunity

4. Psychological Testing

5. National Labor-Management Relations Acts

6. Manpower Development and Training Act

7. Wages and Hours Laws

8. Health and Safety Regulations

9. Fair Labor Standards Acts

10. Patent Laws and Employee Inventiveness

D. The Future of the Personnel Management Function

   1. The Present Personnel Problems of Complex Organizations
   2. Relevance of Different Types of Research Programs
   3. Organizational Development and the Need for Institutional Change
   4. Bases for Evaluating Effective Organizations and Effective Personnel Policies

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AREA X

ADVANCED QUANTITATIVE ANALYSIS

AREA OF COMPETENCY

ADVANCED QUANTITATIVE ANALYSIS

In recent years tremendous growth has occurred in the use of sophisticated statistical and other management science models in analyzing administrative problems. In some cases applications have taken the form of preliminary or exploratory model building designed to uncover basic factors which impinge on organizational effectiveness. In other cases quantitative analysis has been brought to bear in special studies of some particular aspect of operations for which specific improvements are desired. In such cases the key factors may have already been identified and the search is for the best mix of factors given a change in requirements or facilities. Often the techniques of experimental design employing analysis of variance or regression analysis are helpful in these two categories. A third type of application arises with repetitive problems -- those of a generic nature which recur periodically. It is often valuable to explore the generic nature of these problems at a sufficient level of complexity with the hope of establishing useful decision rules to be used on subsequent occurrences.

Successful managerial applications of statistical and management science models require a deep understanding of theory, methods, and procedures as well as an understanding of their limitations. The purpose of this area is to provide this advanced level of comprehension by building on the basic quantitative analysis area material for those who expect to be closely involved with quantitative analysis in their careers.

This Area encompasses materials which can be conveniently grouped as follows:

I. Sampling and Statistics

1. Sampling theory and procedures
2. Experimental design
3. Regression analysis

II. Management Science

1. Model-building
2. Analytical; linear numerical models
3. Simulation

I. Sampling and Statistics

The first segment, sampling and statistics, constitutes selected topics from statistical theory and methods. Their treatment in this area will emphasize their use in special studies or decision situations which require specific answers to one or more questions. An experimental approach is taken assuming one can precisely define the relevant population for which inferences are to be made and that an experiment can be designed and measurement of key variables conducted. For example management may request a special study of the effects of various packaging, advertising, and distributing policies on general consumer response to a product or of the various factors on which a forecast can be developed for scheduling operations.

The success of any statistical study depends on careful planning of the collection, analysis, and interpretation of the data. Various sampling procedures and their underlying statistical theory are covered in this Area. The analyst also has available a wide range of statistical designs from which to choose. A number of these are discussed in this Area. The overall objectives are 1) to familiarize students with basic sample survey theory, its application in the social sciences, and its relation to the analysis of data, 2) to demonstrate the importance and power of a carefully designed analysis, and 3) to develop a working capability on the part of the student in statistical methods and their application in management situations.

The specific objectives, content outline, and texts for the subareas 1) sampling theory and procedures, 2) experimental design, and 3) regression analysis will now be taken up in turn.

Objectives of Sampling Theory and Procedures

The primary purpose of this subarea of advanced quantitative methods is to familiarize students with basic sample survey theory and application of the theory in social science areas.

In general, students are expected to be able to design an optimal sample survey, i.e.,

1. minimize mean square error for given costs, or
2. minimize costs for given mean square errors

More specifically, students are expected to be able:

1. To understand the assumptions and limitations of the various sampling procedures listed below and to apply properly a particular sampling technique or a combination of sampling procedures for a given situation.

    A. Basic sampling techniques

        (1) Probability sampling

            a) Simple random sampling
            b) Stratified random sampling
            c) Cluster sampling
            d) Systematic sampling
            e) Multistage and area sampling
            f) Work sampling

        (2) Judgment sampling

            a) Quota sampling
            b) Chunk sampling

2. To know the advantages and disadvantages of the following measurement methods so as to reduce measurement errors.

   A. Mail questionnaire (self-enumeration methods)
   B. Personal interview
   C. Panel
   D. Coincidental method (telephone method)
   etc.

3. To comprehend the various estimation methods and apply a "best" estimator(s) for a given situation.

4. To apply a proper statistical analysis for the data collected, e.g.,

   A. Estimation of sampling errors and
   B. Estimation of nonsampling errors.

Content Outline: Sampling Theory and Procedures

I. Introduction

1. What is sampling? Why sample?
2. History of development of sampling theory and recent activities in the field of sampling
3. The role of sampling theory
4. Scope of this course
5. Definition of some fundamental terms to be used. Population, list, characteristic, elementary unit, population of analysis, equal complete coverage, probability sampling, equal and unequal probability sample, sample plan, sampling unit, sample design, estimate, estimator, precision and accuracy of an estimate, true value, expected survey value (preferred procedure), listing unit, sampling error, non-sampling error, response error, mean square error (MSE), etc.

II. Simple Random Sampling

1. Definitions and notations -- Reasons for discussing simple random sampling, definitions and notations of terminology
2. Properties of the estimators (mean and total)
3. Variances of the estimators -- absolute and relative precision of the estimators
4. Estimation of sample size

5. Estimation of the standard error from a sample
6. Estimation of means and totals over subpopulation
7. Sampling for proportions and percentages: qualitative characteristics, variances of the estimators, the binomial and hypergeometric distribution, confidence limit, estimation of proportions over subpopulations
8. Estimation of ratio: methods of estimation, different types of ratio estimators, approximate variance of the ratio estimator, bias of the ratio estimator, estimation of the variance from the sample, comparison of ratio estimator with unbiased estimators

III. Stratified random sampling

1. Some hypothetical examples
2. Notations
3. Sampling scheme
4. Reasons for stratified sampling
5. Properties of the estimators (mean, total, proportion)
6. The estimated variances -- strata variance, the variances of estimators
7. Allocation of sample when costs of sampling or precision is specified -- optimum allocation, proportional allocation, stratification after sampling
8. Relative precision of stratified random and simple random sampling
9. Use of ratio estimators with stratified random sampling: the combined ratio estimator, the separate

ratio estimator, properties and the variance of the estimators

10. Illustrations

IV. Cluster sampling (simple one- or two-stage cluster sampling)
   1. Some hypothetical examples
   2. Reasons for cluster sampling
   3. Terminology and notation
   4. Sampling scheme
   5. Properties of the estimators (mean, total, proportions)
   6. The variances of the estimators and the sample estimates of the variances
   7. Comparison of cluster sampling and simple random sampling: Intraclass correlation
   8. Construction of cost functions -- simple and general cost functions
   9. Optimum design with simple two-stage cluster sampling
   10. Other topics in cluster sampling -- cluster units of unequal size, sampling with probability proportionate to size, sampling with arbitrary probabilities

V. Systematic random sampling
   1. General description
   2. Relation to stratified and cluster sampling
   3. Variance of the estimated mean
   4. Methods of arranging population in some order -- random order, linear trend, periodic variation, auto correlation

5. Estimation of the variance from a sample
6. Some illustration

VI. Multistage, area and work sampling

For these sampling methods, only brief discussions using cases will be offered.

VII. Illustration of biases and non-sampling errors in survey results

Measurement and control of non-sampling errors, role of non-sampling errors in determining survey design, types of non-sampling errors -- non-response, interviewer biases, response errors, etc.

Texts for Sampling Theory and Procedures

Cochran, W.G., Sampling Technique, 1963, 2nd ed., John Wiley & Sons, Inc.

Kish, L., Survey Sampling, 1965, John Wiley & Sons, Inc.

Objectives of Experimental Design

The student should be:

1. Familiar with the following subject matter from previous course work:
    a. frequency distributions in one variable - continuous and discrete - and parameters-measures of central tendency and dispersion
    b. elementary probability theory - basic theorems for computing probability, random variables and mathematical expectation
    c. population parameters and sample statistics
    d. probability sampling and sampling error
    e. sampling distributions for mean and proportion
    f. elementary statistical inference - estimation and decision rules for means and proportions including consideration of sampling error, extent of sampling, control of risks associated with sampling error
2. Able to employ specific probability distributions as sampling distributions:
    a. normal distributions
    b. binomial and hypergeometric distributions
    c. chi-square distribution
    d. student t-distribution
    e. F-distribution

3. Able to discuss the "principles" of experimentation in terms of
   a. objectives of experimentation and design of experiments
   b. basic concepts of experimental methods, such as experimental unit; experimental error; effects - treatments, blocks, iteration, etc.; replication; randomization; and comparisons.
4. Be able to explain the linear additive model concept, its basic advantages and disadvantages, and its role in identifying several common experimental designs (see 7).
5. Be able to perform statistical inference - both interval estimation and hypothesis testing for
   a. the variance and standard deviation of a single normal population
   b. the difference of means of two normal (or nearly so) populations under several conditions - e.g., equal and unequal population variances, paired and unpaired observations.
   c. the ratio of variances of two normal distributions
   d. the proportion of a binomial population
6. Be able to carry out an "analysis of variance" on a specific set of data - the systematic partitioning of a total sum of squares into components identified with specific sources of variation.
   a. One-way classification - emphasizing tests of significance and confidence interval estimation for treatment means, linear additive model and variance components, assumptions underlying analysis of variance,

residual mean squares or experimental error, sampling error, and subsampling.

b. Multi-way classifications - emphasizing topics mentioned for one-way classification as appropriate and including interaction, selected treatment comparisons, and efficiency of design.

7. Be able to identify and discuss the appropriate use of the following designs (both with and without replication where meaningful):
   a. completely random
   b. randomized complete block
   c. Latin squares
   d. factorial experiments
8. Be able to conduct tests of significance based on the X^2 distribution for homogeneity of variances from several populations and for goodness of fit for continuous distributions.
9. Be able to carry out selected distribution-free statistical tests such as sign tests, randomness tests, median tests, and the like, depending on the topical coverage of the text selected for study in this segment. The purposes of including material on distribution-free tests are to demonstrate the need for tests of this type, distinguish them from distribution-based tests, and provide examples of this class of statistical methods.

Content Outline - Experimental Design

A. Summary of basic theory in probability and statistics

  1. Descriptive statistics and data summarization
  2. Probability and probability distributions (normal, binomial, others)
  3. Mathematical expectation and expected values
  4. Populations and samples
  5. Probability samples
  6. Sampling distributions for sampling from a normal distribution
     - a. normal distribution
     - b. X^2 distribution
     - c. student t-distribution
     - d. F-distribution

B. Linear additive model for statistical inference about means and variances.

  a. confidence intervals for μ and σ^2

  b. significance tests and decision rules for μ and σ^2

  c. power of a test

C. Principles of experimental design

  a. objectives of experimentation

  b. experimental unit and experimental error

  c. replication

  d. randomization

  e. treatments

  f. error control

D. Specific topics - continuous data, linear additive model

1. Comparisons involving two means

   a. unpaired observations

   b. paired observations

2. Analysis of variance

   a. One-way classification

      - completely random design
      - subsampling
      - assumptions underlying analysis of variance

   b. multi-way classification

      - randomized complete block design
      - replications and interaction
      - Latin squares
      - transformations

   c. factorial experiments

      - 2 x 2 factorial experiment
      - linear models for factorial experiments
      - selected treatment comparison

3. Further uses of X^2 distribution

   - homogeneity of variances
   - goodness of fit for continuous distributions

E. Specific topics - enumeration data

1. One-way classifications

   - nature of the X^2 test criterion
   - inference for two-all tables

2. Contingency tables
    - independence in data
    - homogeneity of two-cell samples
    - additive of X^2 application

F. Distribution-free statistics - selected topics

1. Order relationships - sign or rank based
2. Median tests

Texts for Experimental Design:

Ostle, *Statistics in Research*, Iowa State Univ., 1963

Maroney, *Facts from Figures*, Penquin Books, 1951

Regression Analysis

This subunit is designed to acquaint the student with applications of regression analysis to problems in management and the social sciences. Theory is developed as a foundation for practice, and procedures are discussed in terms of realistic examples.

Objectives of Regression Analysis

The student who has completed the subunit on regression analysis should be able to:

1. Identify situations in his area of vocational or professional interest where standard regression-analysis procedures can be applied as an aid to evaluation and decision making.
2. Determine particular procedures to be used.
3. Implement the procedures with the aid of desk calculators or computers and computer printout.
4. Evaluate the statistical results.
5. Recognize those cases where standard regression analysis procedures must be modified, and be able to discuss the case with statistical specialists so as to obtain necessary guidance.

Content Outline of Regression Analysis

A. Concept of a linear statistical model

B. Simple linear regression model with error term unspecified

  1. Point estimation of regression parameters by method of least-squares
  2. Properties of least-squares estimators

C. Simple linear regression model with normal error term

  1. Point estimation of regression parameters by method of maximum likelihood
  2. Properties of estimators of regression parameters with normal-error model

D. Inferences with normal model

  1. Inferences on regression parameters
    a) interval estimation of individual regression parameters
    b) tests on individual regression parameters
    c) Simultaneous estimation of regression parameters joint confidence region
  2. Inferences on the response (i.e., the dependent variable)
    a) interval estimation of mean response at specified level of independent variable
    b) prediction interval for mean of q new observations on response at specified level of independent variable (including case where q = 1)

        c) simultaneous estimation: confidence hand for population regression line

        d) simultaneous estimation: family of predictions for k new observations on response at k different levels of independent variable

E. Analysis of variance approach

    1. Decomposition of total uncorrected sum of squares and degrees of freedom into regression and residual components

    2. F test for regression

    3. Descriptive coefficients of determination and correlation

F. Evaluation of aptness of mode, and remedial actions

    1. Replication and test for lack of fit

    2. Tests for autocorrelation

        a) Durkin-Watson test

        b) application of run test to residuals

    3. Use of residual plots

    4. Normalizing and variance stabilizing transformations

    5. Weighted least-squares

    6. Use of model with autocorrelated error term.

G. Matrix approach to simple linear regression (matrix formulas and procedures for items listed in B through F)

H. General linear regression model and matrix methods

    1. General linear regression model

        a) multiple regression models

- b) Curvilinear regression models
- c) Polynomial regression models
- d) Nonlinear models that are intrinsically linear, and relevant linearizing transformations

2. Extension of matrix formulas and procedures to the general linear regression case
3. The General Linear Hypothesis
    - a) Original model
    - b) Model under the hypothesis
    - c) Testing a general linear hypothesis in regression situations; e.g., test of whether regression exists, sequential F test, test for lack of fit; other tests

I. Topics in General Linear Regression
1. Use of dummy variables
2. Multicollinearity
3. Procedures for selecting best set of independent variables for making inferences on response.

Texts for Regression Analysis

Draper and Smith, Applied Regression Analysis, New York: Wiley, 1966.

Johnston, Econometric Methods, New York: McGraw-Hill, 1963.

II. Management Science

Management Science is an interdisciplinary segment which employs scientific methods, mathematics, and statistics for the task of better decisions in a complex uncertain world. The essence of this segment is model building -- an abstraction of reality which can be studied independently to provide a deeper understanding of the real world.

Management Science has emerged since World War II, although some of the central ideas trace back several centuries. It is not coincidental that Management Science parallels the development of computer technology. By enabling the solution of elaborate models, (that pre-computer would have been economically infeasible to do), the computer has spurred further development and more importantly allowed for direct applications.

The nature of models and the partly art and partly science of model-building is considered initially. Models can be very simple, i.e., a single equation relating costs to outputs, to complex, i.e. a multi-equation system of equations describing flows of product from factories to warehouses to highly intricate, i.e., a model of the many facets of the stock market. They can incorporate uncertainty, be static or dynamic, and have other features determined by the ingenuity of the model builder. For a particular case, the model can be anything from a highly simplified to a highly duplicative representation of reality. Ideally, it should be simple enough to solve economically, yet rich enough in detail to be useful. Finding this blend is still largely an art, but one which flourishes with ones understanding of quantitative analysis.

The meaning of a solution to a model and methods to arrive at solutions are considered in this segment. Three general solution methods: Analytical, Numerical, and Simulation, are introduced.

Analytical solutions are direct ones employing classical mathematics, i.e. calculus, matrix algebra, etc. An iterative process of moving from an initial solution to better ones and finally to the best solution is called a numerical solution. Simulation solutions are those obtained by experimentation on a model.

Analytical solutions are the quickest; unfortunately, they only exist for rather simple models. Some of these are illustrated, i.e. Economic order quantity model. Numerical solutions have wide applicability. The linear programming model and its various special cases, which have numerical solutions, are developed. Simulation methods are usually required when the model is highly complex and therefore not amenable to other methods.

It involves letting the model operate under different conditions and observing the results. Experimental design and sampling methods which provide the basis for simulation are introduced here.

An important aspect of this subarea is the independent project done by the student. He is expected to model some aspect of reality relevant to management, carry out the solution process, and analyze the results.

Management Science Objectives

The student is expected to:

1. Explain the nature of model-building and describe its usefulness in a management analysis context.

2. Explain the meaning of a solution to a model and differentiate between analytical, numerical, and simulation solutions.

3. Discuss model-building as a means of isolating the important aspects of reality for study in a well structured analysis in a management decision-making context.

4. Formulate the general linear programming model including definition of variables, statement of objective function, constraint equations, and non-negativity restrictions.

5. Discuss the assumptions (linearly and divisibility) of the linear programming model and the extent that they inhibit its realism.

6. Describe decision situations in the real world in which the linear programming model has been or could be applied fruitfully.

7. Perform a graphical solution for a 2 variable linear programming problem.

8. Demonstrate facility with the simplex method for solving the general linear programming problem.

9. Explain the numbers in simplex tableau,rules for entering new basic variables, the pivoting operation, and stopping rules in vector terms.

10. Explain how degeneracy of the L-P model can occur, and its effect on applicability.

11. Explain how sensitivity analysis provides a fuller understanding of the complex interactions of a linear programming application.

12. Formulate, solve, and discuss management applications for the Transportation Problem.

13. Formulate, solve, and discuss management applications of the Assignment Problem.

14. Define simulation and explain conditions under which simulation methods provide the best means for analyzing a system.

15. Formulate some management system in terms of their components, exogeneous and endogeneous variables, relationships, and parameters.

16. Explain the role of experimental design in the simulation study.

17. Explain the role of sampling in a simulation study.

18. Explain the role of the computer in a simulation study.

19. Explain how the use of uniformly distributed random numbers allow sampling any probability distribution.

20. Explain the multiplicative congruent method for generating pseudorandom numbers.

21. Formulate a model of some aspect of a management system, solve it, and apply the results toward more efficient operations.

Management Science

Outline

- I. Introduction to Management Science
  - A. Model-building -- the essence of Management Science
  - B. Historical development
  - C. Methodology
  - D. Scope
  - E. Usefulness
  - F. Some important applications
- II. Model-Building
  - A. The importance of model building
  - B. Art or science
  - C. Complexity versus simplicity considerations
  - D. Costs versus benefits considerations
  - E. Classification of models
    - 1) Dynamic or static
    - 2) Deterministic or stochastic
  - F. Model solution
    - 1) What is a solution
    - 2) Methods of solution
      - a) Analytical
      - b) Numerical
      - c) Simulation
- III. Analytical Solution Methodology
  - A. Economic order quantity model
  - B. Queuing methods

IV. Numerical Solutions -- Linear Optimization (Programming) Models

- A. Introduction
  - 1. Allocation of limited resources in "best" manner
  - 2. Assumption of linearity and divisibility
  - 3. Iterative solution process
  - 4. Examples of wide-applicability of model
    - a. Assignment problems
    - b. Distribution problems
    - c. Scheduling problems
    - d. Mixing problems
    - e. Other problems
- B. General Formulation
  - 1. Objective function
  - 2. Direction of optimization
  - 3. Constraint equations
  - 4. Restrictions
- C. Mathematical Formulation of Model
  - 1. Algebraic formulation
  - 2. Matrix algebra formulation
- D. Geometric Insights
  - 1. Feasible solution space
  - 2. Convex set theory
  - 3. Graphical solution to a 2-dimension problem
- E. Necessary Theory of Vector Analysis, Linear Algebra

- F. The Simplex Method of Solution
  - 1. Slack variables
  - 2. Basic feasible solution
  - 3. Initial tableau
  - 4. Introduction of new variables into feasible solution
  - 5. Rules for revising tableau - pivoting
  - 6. Stopping rule
  - 7. Determination of objective function at optimization
- G. Vector Analysis and the Simplex Method
- H. Sensitivity Analysis
- I. Special Cases of Linear Optimization
  - 1. Transportation model
  - 2. Assignment model

V. Simulation

- A. A Perspective
  - 1. Definitions of simulation
  - 2. Experimental approach
  - 3. Historical development
  - 4. Nature of models or systems requiring simulation
  - 5. Contrast of simulation solution to analytical or numerical solutions
  - 6. Applications

B. Methodology
  1. Problem definition; systems analysis
  2. Role of experimental design
  3. Role of sampling
  4. Role of the computer
  5. Model validity

C. Problem Definition
  1. The system
    a) Components
    b) Exogeneous and endogeneous variables
    c) Relationships
    d) Parameters
  2. Understanding needed about system

D. Experimental Design
  1. Precision goals, error risks
  2. Choice of design methodology, analysis of variance, estimation, etc.
  3. Use of replication, number of trials
  4. Time interval of simulation
  5. Initialization procedures

E. Pseudorandom Numbers
  1. Need for in simulation
  2. Theory for uniformly distributed random numbers
  3. Multiplicative congruent method
    a) Number theory basis

b) Cycle length

c) Statistical properties

4. Computer generation -- subroutine RANDU

F. Monte Carlo Sampling

1. Review of probability distribution, cumulative distribution theory

2. Inverse theorem -- use of uniformly distributed random numbers for sampling any probability distribution

a) Graphical insight

b) Analytical or numerical methods

3. Sampling a normal distribution

G. Computer and Simulation

1. Need for computer

2. Simulation languages

H. Interesting applications of simulation

VI. Student Project

Instructional Packages for Management Science

1. Wagner, Principles of Operations Research, Prentice-Hall, 1969.

2. Richmond, Operations Research, The Ronald Press, 1968.

3. Naylor, Balintfy, Burdick, and Chu, Computer Simulation Techniques: Wiley, 1968.